

APPENDIX A

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APPENDIX B

THE METRIC SYSTEM AND METRIC UNIT CONVERSION CHARTS

The Metric System simply and logically coordinates the measurements of length, area, volume, and mass into one decimalized system. United States currency, with its unexcelled convenience, was the first large scale national use of a decimal system. The ratio between the units of the series - dollars, dimes, cents, and mills - is ten. Additions and other numerical operations are simple. Calculations with metric units require no conversion from unit to unit, as for example between inches and feet or ounces and pounds.

In the Metric System there is one series of units for length, one for area, one for volume or capacity, and one for mass, and one for temperature.

LENGTH - The common metric units of length are the millimeter (mm) for small dimensions, the centimeter (cm) for daily practical use, the meter (m) for expressing dimensions of larger objects and short distances and the kilometer (km) for longer distances. The centimeter is about four-tenths of an inch. The meter is about forty inches and the kilometer about six-tenths of a mile ([figure B-1](#)). When drawing to metric scale, engineering and product dimensions are in millimeters. Architectural drawings can be in millimeters or centimeters. On land surveys the unit is the meter. On maps the kilometer is the unit of measurement.

AREA - Small areas are usually measured in square centimeters (cm^2). In building and construction the square meter (m^2) is used and is about 20 percent larger than a square yard. The hectare (ha) is used for land surveys and is about 2.5 acres.

VOLUME - For volume the most convenient unit is the cubic decimeter (dm^3), referred to as the liter (l). The liter is slightly larger than the U.S. liquid quart but smaller than the U.S. dry quart and the British Imperial quart. The preferred unit for dispensing unit for dispensing drugs and for scientific work is the cubic centimeter (cm^3) or milliliter (ml) as it is also called. For measuring amounts of concrete and excavations the cubic meter (m^3) is used.

MASS - In pharmaceutical and scientific work the gram (g) is the most convenient unit. There are slightly less than 30 grams in one avoirdupois ounce. For most other uses the kilogram (kg) is convenient and is approximately 2.2 pounds. The metric ton (t), 1000 kg, is used for farm commodities, minerals, and large shipments. It is convenient that a liter of pure water at standard temperature and pressure has a mass of one kilogram (discrepancy less than one part in 10,000). This relationship makes it easy to determine the mass of any known volume of water, or of any other liquid if its specific gravity is known.

TEMPERATURE - All countries using the Metric System of weights and measures also use the Celsius (C) scale (formerly called centigrade) for ordinary measurement of temperature. On the Celsius scale pure water at standard atmospheric pressure freezes at 0° and boils at 100° . Normal human body temperature is 37° , while a comfortable room temperature is about 22° . The preferred temperature scale for engineering and physics is the kelvin (K) which has the same units as the Celsius and where the freezing point of pure water is 273.15°K .

Index of Units and Conversion Tables

[Figure B-1.](#) Reference Conversion Charts

[Table B-4.](#) Fraction/Decimal/Millimeter Conversion Chart

[Table B-1.](#) Symbols and Relationships of Metric Units

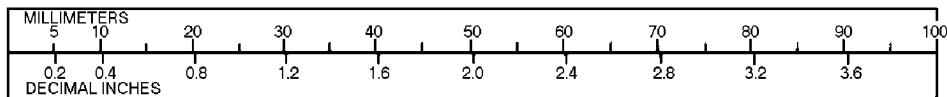
[Table B-5.](#) Metric Unit Conversions

[Table B-2.](#) Inches to Millimeters Conversion Chart

[Table B-6.](#) Alphabetical Index of Metric Unit Conversions

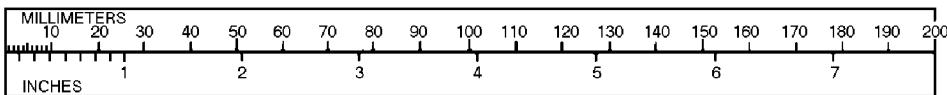
[Table B-3.](#) International System of Units

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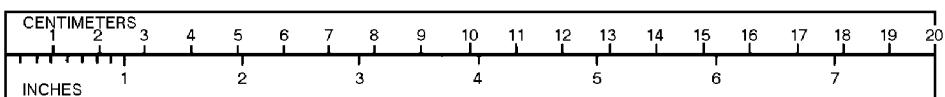
1 Millimeter = 0.03937 Inch

Scale - 1 Centimeter = 5 Millimeters



1 Inch = 25.4 Millimeters

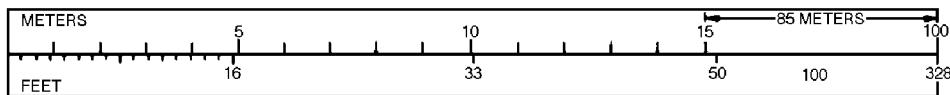
Scale - 1 Centimeter = 10 Millimeters



1 Centimeter = 0.39370 Inch

Scale - 1 Centimeter = 1 Centimeters

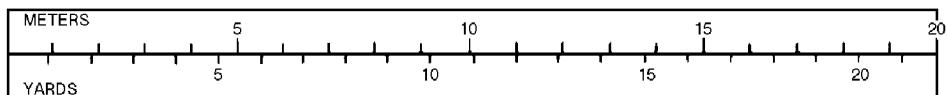
1 Inch = 2.54 Centimeters



Scale - 1 Centimeter = 1 Meter

1 Foot = 0.3048 Meter

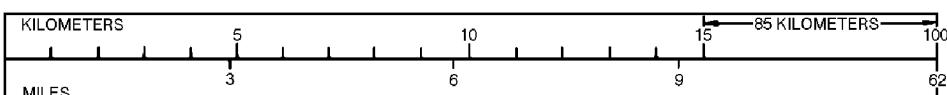
1 Meter = 3.28083 Feet (39.37 Inches - Act of Congress 1866)



1 Meter = 1.09361 Yards

1 Yard = 0.9144 Meter

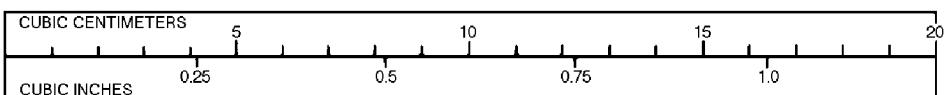
Scale - 1 Centimeter = 1 Meter



1 Kilometer = 0.62137 Mile

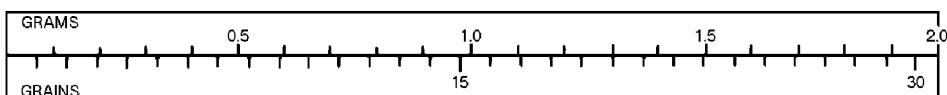
Scale - 1 Centimeter = 1 Kilometer

Mile = 1.6093 Kilometers



1 Cubic Centimeter = 0.061 Cubic Inch

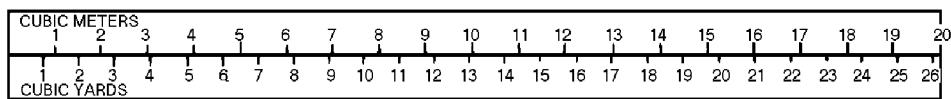
Scale - 1 Centimeter = 1 Cubic Centimeter



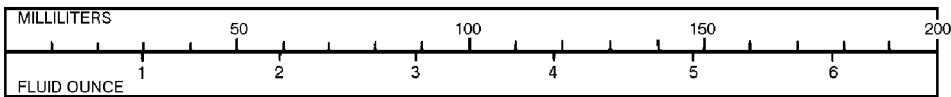
1 Gram = 15.4324 Grains

Scale - 1 Centimeter = 0.1 Gram

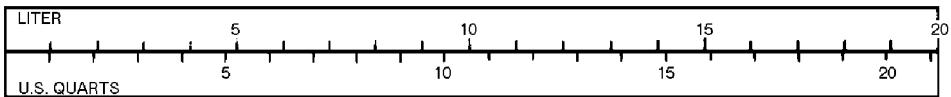
Figure B-1. Reference Conversion Charts (Sheet 1 of 2)



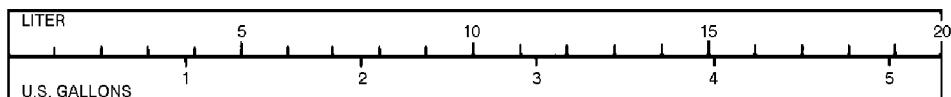
1 Cubic Meter = 1.30795 Cubic meter Scale - 1 Centimeter = 1 Cubic Meter
 1 Cubic Yard = 0.76455 Cubic meter



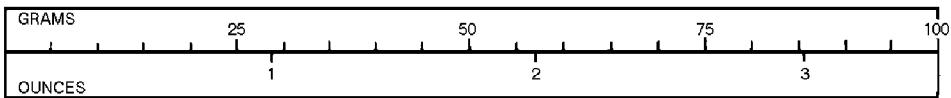
1 Milliliter = 0.03381 Fluid Ounce Scale - 1 Centimeter = 10 Milliliter
 1 Fluid Ounce = 29.57 Milliliters



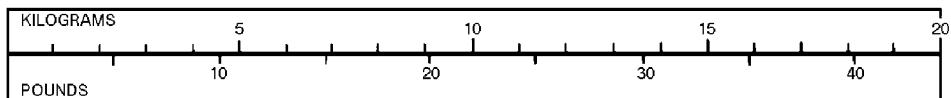
1 Liter = 1.0567 U.S. Quarts 1 U.S. Quart = 0.9463 Liter Scale - 1 Centimeter = 1 Liter



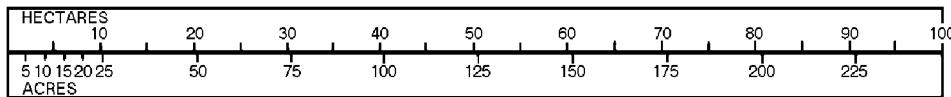
1 Liter = 0.26418 U.S. Gallon Scale - 1 Centimeter = 1 Liter
 1 U.S. Gallon = 3.7853 Liters



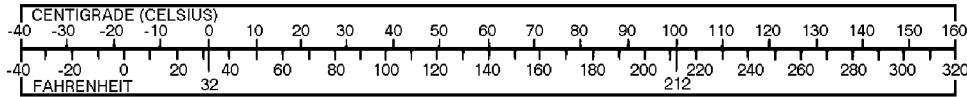
1 Avoirdupois ounce = 28.3495 Grams Scale - 1 Centimeter = 5 Grams



1 Kilogram = 2.2045 Pounds Scale - 1 Centimeter = 1 Kilogram
 1 Pound = 0.45359 Kilogram



1 Hectare = 2.47105 Acres Scale - 1 Centimeter = 5 Hectares
 1 Acres = 0.40489 Hectares 40 Acres = 16.19 Hectares



Fahrenheit = $\frac{9}{5}$ Centigrade plus 32 Scale - 1 Centigrade = 10° Centigrade
 Centigrade = Fahrenheit minus 32 $\times \frac{5}{9}$

Figure B-1. Reference Conversion Charts (Sheet 2 of 2)

Table B-1. Symbols and Relationships of Metric Units

Quantity	Unit (Note 1)	Symbol	Relationship of Units
Length	millimeter centimeter decimeter <u>meter (Note 2)</u> kilometer	mm cm dm m km	1 mm = 0.001 m 1 cm = 10 mm 1 dm = 10 cm 1 m = 100 cm 1 km = 1000 m
Area	square centimeter square decimeter <u>square meter (Note 2)</u> are hectare square kilometer	cm ² dm ² m ² a ha km ²	1 cm ² = 100 mm ² 1 dm ² = 100 cm ² 1 m ² = 100 dm ² 1 a = 100 m ² 1 ha = 100 a 1 km ² = 100 ha
Volume	{ cubic centimeter { millimeter { cubic decimeter { liter <u>cubic meter (Note 2)</u>	cm ³ ml dm ³ l m ³	1 cm ³ } = 0.001 l 1 ml } 1 dm ³ } = 1000 ml 1 l } 1 m ³ = 1000 l
Mass*	milligram gram <u>kilogram (Note 2)</u> metric ton	mg g kg t	1 mg = 0.001 g 1 g = 1000 mg 1 kg = 1000 g 1 t = 1000 kg

*Mass is the quantity of matter. Weight is a force Earth's attraction for a given mass. Generally the term mass is meant when we use weight.

Notes:

1. The three main units; meter, liter, and gram can be changed to more convenient sized units for specific purposes by means of several well known prefixes. Milli means 1/1000. Centi means 1/100. Deci means 1/10. Kilo means 1000. One merely learns the main units and the value of the most commonly used prefixes. The symbols for metric units are the same for single and plural amounts and are not followed by a period. Rates are usually shown by use of the slash as in m/s.
2. The underlined units in this table are basic or derived units of the International System of Units (SI).

Table B-2. Inches to Millimeters Conversion Chart

Inch	mm								
.001	0.0254	.051	1.2954	.101	2.5654	.151	3.8354	.201	5.1054
.002	0.0508	.052	1.3208	.102	2.5908	.152	3.8608	.202	5.1308
.003	0.0762	.053	1.3462	.103	2.6162	.153	3.8862	.203	5.1562
.004	0.1016	.054	1.3716	.104	2.6416	.154	3.9116	.204	5.1816
.005	0.1270	.055	1.3970	.105	2.6670	.155	3.9370	.205	5.2070
.006	0.1524	.056	1.4224	.106	2.6924	.156	3.9624	.206	5.2324
.007	0.1778	.057	1.4478	.107	2.7178	.157	3.9878	.207	5.2578
.008	0.2032	.058	1.4732	.108	2.7432	.158	4.0132	.208	5.2832
.009	0.2286	.059	1.4986	.109	2.7686	.159	4.0386	.209	5.3086
.010	0.2540	.060	1.5240	.110	2.7940	.160	4.0640	.210	5.3340
.011	0.2794	.061	1.5494	.111	2.8194	.161	4.0894	.211	5.3594
.012	0.3048	.062	1.5748	.112	2.8448	.162	4.1148	.212	5.3848
.013	0.3302	.063	1.6002	.113	2.8702	.163	4.1402	.213	5.4102
.014	0.3556	.064	1.6256	.114	2.8956	.164	4.1656	.214	5.4356
.015	0.3810	.065	1.6510	.115	2.9210	.165	4.1910	.215	5.4610
.016	0.4064	.066	1.6764	.116	2.9464	.166	4.2164	.216	5.4864
.017	0.4318	.067	1.7018	.117	2.9718	.167	4.2418	.217	5.5118
.018	0.4572	.068	1.7272	.118	2.9972	.168	4.2672	.218	5.5372
.019	0.4826	.069	1.7526	.119	3.0226	.169	4.2926	.219	5.5626
.020	0.5080	.070	1.7780	.120	3.0480	.170	4.3180	.220	5.5880
.021	0.5334	.071	1.8034	.121	3.0734	.171	4.3434	.221	5.6134
.022	0.5588	.072	1.8288	.122	3.0988	.172	4.3688	.222	5.6388
.023	0.5842	.073	1.8542	.123	3.1242	.173	4.3942	.223	5.6642
.024	0.6096	.074	1.8796	.124	3.1496	.174	4.4196	.224	5.6896
.025	0.6350	.075	1.9050	.125	3.1750	.175	4.4450	.225	5.7150
.026	0.6604	.076	1.9304	.126	3.2004	.176	4.4704	.226	5.7404
.027	0.6858	.077	1.9558	.127	3.2258	.177	4.4958	.227	5.7658
.028	0.7112	.078	1.9812	.128	3.2512	.178	4.5212	.228	5.7912
.029	0.7366	.079	2.0066	.129	3.2766	.179	4.5466	.229	5.8166
.030	0.7620	.080	2.0320	.130	3.3020	.180	4.5720	.230	5.8420
.031	0.7874	.081	2.0574	.131	3.3274	.181	4.5974	.231	5.8674
.032	0.8128	.082	2.0828	.132	3.3528	.182	4.6228	.232	5.8928
.033	0.8382	.083	2.1082	.133	3.3782	.183	4.6482	.233	5.9182
.034	0.8636	.084	2.1336	.134	3.4036	.184	4.6736	.234	5.9436
.035	0.8890	.085	2.1590	.135	3.4290	.185	4.6990	.235	5.9690
.036	0.9144	.086	2.1844	.136	3.4544	.186	4.7244	.236	5.9944
.037	0.9398	.087	2.2098	.137	3.4798	.187	4.7498	.237	6.0198
.038	0.9652	.088	2.2352	.138	3.5052	.188	4.7752	.238	6.0452
.039	0.9906	.089	2.2606	.139	3.5306	.189	4.8006	.239	6.0706
.040	1.0160	.090	2.2860	.140	3.5560	.190	4.8260	.240	6.0960
.041	1.0414	.091	2.3114	.141	3.5814	.191	4.8514	.241	6.1214
.042	1.0668	.092	2.3368	.142	3.6068	.192	4.8768	.242	6.1468
.043	1.0922	.093	2.3622	.143	3.6322	.193	4.9022	.243	6.1722
.044	1.1176	.094	2.3876	.144	3.6576	.194	4.9276	.244	6.1976
.045	1.1430	.095	2.4130	.145	3.6830	.195	4.9530	.245	6.2230
.046	1.1684	.096	2.4384	.146	3.7084	.196	4.9784	.246	6.2484
.047	1.1938	.097	2.4638	.147	3.7338	.197	5.0038	.247	6.2738
.048	1.2192	.098	2.4892	.148	3.7592	.198	5.0292	.248	6.2992
.049	1.2446	.099	2.5146	.149	3.7846	.199	5.0546	.249	6.3246
.050	1.2700	.100	2.5400	.150	3.8100	.200	5.0800	.250	6.3500

Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
.251	6.3754	.301	7.6454	.351	8.9154	.401	10.1854	.451	11.4554
.252	6.4008	.302	7.6708	.352	8.9408	.402	10.2108	.452	11.4808
.253	6.4262	.303	7.6962	.353	8.9662	.403	10.2362	.453	11.5062
.254	6.4516	.304	7.7216	.354	8.9916	.404	10.2616	.454	11.5316
.255	6.4770	.305	7.7470	.355	9.0170	.405	10.2870	.455	11.5570
.256	6.5024	.306	7.7724	.356	9.0424	.406	10.3124	.456	11.5824
.257	6.5278	.307	7.7978	.357	9.0678	.407	10.3378	.457	11.6078
.258	6.5532	.308	8.0232	.358	9.0932	.408	10.3632	.458	11.6332
.259	6.5786	.309	8.0486	.359	9.1186	.409	10.3886	.459	11.6586
.260	6.6040	.310	8.0740	.360	9.1440	.410	10.4140	.460	11.6840
.261	6.6294	.311	8.0994	.361	9.1694	.411	10.4394	.461	11.7094
.262	6.6548	.312	8.1248	.362	9.1948	.412	10.4648	.462	11.7348
.263	6.6802	.313	8.1502	.363	9.2202	.413	10.4902	.463	11.7602
.264	6.7056	.314	8.1756	.364	9.2456	.414	10.5156	.464	11.7856
.265	6.7310	.315	8.0010	.365	9.2710	.415	10.5410	.465	11.8110
.266	6.7564	.316	8.0264	.366	9.2964	.416	10.5664	.466	11.8364
.267	6.7818	.317	8.0518	.367	9.3218	.417	10.5918	.467	11.8618
.268	6.8072	.318	8.0772	.368	9.3472	.418	10.6172	.468	11.8872
.269	6.8326	.319	8.1026	.369	9.3726	.419	10.6426	.469	11.9126
.270	6.8580	.320	8.1280	.370	9.3980	.420	10.6680	.470	11.9380
.271	6.8834	.321	8.1534	.371	9.4234	.421	10.6934	.471	11.9634
.272	6.9088	.322	8.1788	.372	9.4488	.422	10.7188	.472	11.9888
.273	6.9342	.323	8.2042	.373	9.4742	.423	10.7442	.473	12.0142
.274	6.9596	.324	8.2296	.374	9.4996	.424	10.7696	.474	12.0396
.275	6.9850	.325	8.2550	.375	9.5250	.425	10.7950	.475	12.0650
.276	7.0104	.326	8.2804	.376	9.5504	.426	10.8204	.476	12.0904
.277	7.0358	.327	8.3058	.377	9.5758	.427	10.8458	.477	12.1158
.278	7.0612	.328	8.3312	.378	9.6012	.428	10.8712	.478	12.1412
.279	7.0366	.329	8.3566	.379	9.6266	.429	10.8966	.479	12.1666
.280	7.1120	.330	8.3820	.380	9.6520	.430	10.9220	.480	12.1920
.281	7.1374	.331	8.4074	.381	9.6774	.431	10.9474	.481	12.2174
.282	7.1628	.332	8.4328	.382	9.7028	.432	10.9728	.482	12.2428
.283	7.1882	.333	8.4582	.383	9.7282	.433	10.9982	.483	12.2682
.284	7.2136	.334	8.4836	.384	9.7536	.434	11.0236	.484	12.2936
.285	7.2390	.335	8.5090	.385	9.7790	.435	11.0490	.485	12.3190
.286	7.2644	.336	8.5344	.386	9.8044	.436	11.0744	.486	12.3444
.287	7.2898	.337	8.5598	.387	9.8298	.437	11.0998	.487	12.3698
.288	7.3152	.338	8.5852	.388	9.8552	.438	11.1252	.488	12.3952
.289	7.3406	.339	8.6106	.389	9.8806	.439	11.1506	.489	12.4206
.290	7.3660	.340	8.6360	.390	9.9060	.440	11.1760	.490	12.4460
.291	7.3914	.341	8.6614	.391	9.9314	.441	11.2014	.491	12.4714
.292	7.4168	.342	8.6868	.392	9.9568	.442	11.2268	.492	12.4968
.293	7.4422	.343	8.7122	.393	9.9822	.443	11.2522	.493	12.5222
.294	7.4676	.344	8.7376	.394	10.0076	.444	11.2776	.494	12.5476
.295	7.4930	.345	8.7630	.395	10.0330	.445	11.3030	.495	12.5730
.296	7.5184	.346	8.7884	.396	10.0584	.446	11.3284	.496	12.5984
.297	7.5438	.347	8.8138	.397	10.0838	.447	11.3538	.497	12.6238
.298	7.5692	.348	8.8392	.398	10.1092	.448	11.3792	.498	12.6492
.299	7.5946	.349	8.8646	.399	10.1346	.449	11.4046	.499	12.6746
.300	7.6200	.350	8.8900	.400	10.1600	.450	11.4300	.500	12.7000

Table B-3. International System of Units (SI)

Quantity	Unit	Symbol
Elemental units		
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Temperature	degree Kelvin	°K
Luminous intensity	candela	cd
Supplementary units		
Plane angle	radian	rad
Solid angle	steradian	sr
Derived units		
Area	square meter	m^2
Volume	cubic meter	m^3
Frequency	hertz	Hz (s^{-1})
Density	kilogram per cubic meter	kg/m^3
Velocity	meter per second	m/s
Angular velocity	radian per second	rad/s
Acceleration	meter per second squared	m/s^2
Angular acceleration	radian per second squared	rad/ s^2
Force	newton	N ($kg\ m/s^2$)
Pressure	newton per square meter	N/ m^2
Kinematic viscosity	square meter per second	m^2/s
Dynamic viscosity	newton-second per square meter	N s/ m^2
Work, energy, quantity of heat	joule	J (N m)
Power	watt	W (J/s)
Electric charge	coulomb	C (A s)
Voltage, potential difference, electrootive force	volt	V (W/A)
Electric field strength	volt per meter	V/m
Electric resistance	ohm	Ω (V/A)
Electric capacitance	farad	F (A s/V)
Magnetic flux	weber	Wb (V s)
Inductance	henry	H (V s/A)
Magnetic flux density	tesla	T (Wb/ m^2)
Magnetic field strength	ampere per meter	A/m
Magnetomotive force	ampere	A
Luminous flux	lumen	lm (cd sr)
Luminance	candela per square meter	cd/ m^2
Illumination	lux	lx (lm/ m^2)

USE OF TABLES

Following are step by step directions for the solution to an example conversion problem. The example is: Convert 12 3/4 inches to centimeters.

1. Convert all fractions to decimals. (Refer to [table B-3](#).)
 $12 \frac{3}{4} = 12.75$
2. Refer to [table B-4](#) and find the column for the unit which you have. This would be the column labeled "INCHES" in the "Length" table.
3. Locate the numeral 1 in the column labeled "INCHES."
4. Locate the column labeled "CENTIMETERS."
5. Read the number in the CENTIMETERS column that is in direct line with the numeral 1 located in the INCHES column.
Read 2.540
6. Multiply the number of inches of this example by the conversion factor to obtain the number of centimeters.
 $2.540 \times 12.75 = 32.385$
7. Round off the answer to not over four significant figures (four numbers counting from the first non-zero number on the left. Fewer significant figures may be used depending on the accuracy of measurement and the tolerances allowed. For most work in this manual, centimeters would be expressed as three significant figures.
 $12 \frac{3}{4}$ inches = 32.4 centimeters

Table B-4. Fraction/Decimal/Millimeter Conversion Chart

Fractions	Dec Equiv	MM Equiv	Fractions	Dec Equiv	MM Equiv
1/64	0.01562	0.397	33/64	0.515625	13.097
1/32	0.03125	0.794	17/32	0.53125	13.494
3/64	0.04688	1.191	35/64	0.546875	13.891
1/16	0.0625	1.588	9/16	0.5625	14.288
5/64	0.078125	1.984	37/64	0.578125	14.684
3/32	0.09375	2.381	19/32	0.59375	15.081
7/64	0.109375	2.778	39/64	0.609375	15.478
1/8	0.125	3.175	5/8	0.625	15.875
9/64	0.140625	3.572	41/64	0.640625	16.272
5/32	0.15625	3.969	21/32	0.65625	16.669
11/64	0.171875	4.366	43/64	0.671875	17.066
3/16	0.1875	4.762	11/16	0.6875	17.462
13/64	0.203125	5.159	45/64	0.703125	17.859
7/32	0.21875	5.556	23/32	0.71875	18.256
15/64	0.234375	5.953	47/64	0.734375	18.653
1/4	0.25	6.350	3/4	0.75	19.050
17/64	0.265625	6.747	49/64	0.765625	19.447
9/32	0.28125	7.144	25/32	0.78125	19.844
19/64	0.296875	7.541	51/64	0.796875	20.241
5/16	0.3125	7.938	13/16	0.8125	20.638
21/64	0.328125	8.334	53/64	0.828125	21.034
11/32	0.34375	8.731	27/32	0.84375	21.431
23/64	0.359375	9.128	55/64	0.859375	21.828
3/8	0.375	9.525	7/8	0.875	22.225
25/64	0.390625	9.922	57/64	0.890625	22.622
13/32	0.40625	10.319	29/32	0.90625	23.019
27/64	0.421875	10.716	59/64	0.921875	23.416
7/16	0.4375	11.112	15/16	0.9375	23.812
29/64	0.453125	11.509	61/64	0.953125	24.209
15/32	0.46875	11.906	31/32	0.96875	24.606
31/64	0.484375	12.303	63/64	0.984375	25.003
1/2	0.5	12.700	1	1.0	25.400

Table B-5. Metric Unit Conversions

<u>Length</u>							
Millimeters	Centimeters	Inches	Feet	Yards	Meters		
1.0	0.1000	0.03937	0.003281	0.001094	0.001000		
10.0	1.0	0.3937	0.03281	0.01094	0.01000		
25.40	2.540	1.0	0.08333	0.02778	0.0254		
304.8	30.48	12.0	1.0	0.3333	0.3048		
914.4	91.44	36.0	3.000	1.0	0.9144		
1000.0	100.0	39.37	3.281	1.094	1.0		
<u>Weight</u>							
Grams	Kilograms	Grains	Ounces Avoirdupois	Pounds Avoirdupois			
1000.0	1.0	15,432.0	35.27	2.205			
1.0	0.0010	15,432	0.03527	0.002205			
0.06480	0.00006480	1.0	0.002286	0.0001429			
28.35	0.02835	437.5	1.0	0.0625			
453.6	0.4536	7,000.0	16.0	1.0			
<u>Velocity</u>							
Meters/Sec	Kilometers/Hr	Feet/Sec	Miles/Hr	Knots			
1.0	3.600	3.281	2.237	1.944			
0.2778	1.0	0.9113	0.6214	0.5400			
0.3048	1.097	1.0	0.6818	0.5925			
0.4470	1.609	1.467	1.0	0.8690			
0.5144	1.852	1.688	1.1511	1.0			
<u>Pressure</u>							
Bars (Mega- baryes)	Kilograms/ square cm	Pounds/ square inch	Atmos- pheres	Columns of Mercury (0°C)	Columns of Water (15°C)		
1.0	1.0197	14.50	0.9869	0.7501 29.53	10.21 401.8 33.49		
0.9807	1.0	14.22	0.9678	0.7356 28.96	10.01 394.1 32.84		
0.06895	0.07031	1.0	0.06805	0.05171 2.036	0.7037 27.70 2.309		
1.0133	1.0332	14.70	1.0	0.7600 29.92	10.34 407.1 33.93		
1.3332	1.3595	19.34	1.316	1.0 39.37	13.61 535.7 44.64		
0.03386	0.03453	0.4912	0.03342	0.02540 1.0	0.3456 13.61 1.134		
0.09798	0.09991	1.421	0.09670	0.07349 2.893	1.0 39.37 3.281		
0.002489	0.002538	0.03609	0.002456	0.001867 0.0739	0.02540 1.0 0.08333		
0.02986	0.03045	0.4331	0.02947	0.02240 0.8819	0.3048 12.0 1.0		
<u>Area</u>							
Square Meters	Square Centimeters	Square Inches	Square Feet	Square Yards			
1.0	10,000.0	1,550.0	10.76	1.196			
0.0001	1.0	0.1550	0.001076	0.0001196			
0.0006452	6,452.0	1.0	0.006944	0.0007716			
0.9290	929.0	144.0	1.0	0.1111			
0.8361	8,361.0	1,296.0	9.0000	1.0			
<u>Volume</u>							
Cubic Inches	Cubic Feet	Cubic Yards	Gallons (U.S.)	Quarts (U.S.)	Liters (Cubic Decimeters)	Cubic Meters	Milliliters (Cubic Centimeters)
1.0	0.0005787	0.00002143	0.004329	0.01732	0.01639	0.00001639	16.39
1,728.0	1.0	0.03704	7.481	29.92	28.32	0.02832	28,320
46,656.0	27.0	1.0	202.2	807.9	764.6	0.7646	764,600
231.0	0.1337	0.004951	1.0	4.000	3.785	0.003785	3,785
57.75	0.03342	0.001238	0.2500	1.0	0.9464	0.0009464	946.4
61.02	0.03531	0.001308	0.2642	1.057	1.0	0.001	1,000
61020	353.1	1.308	264.2	1057	1000.0	1	1,000,000
0.06102	0.00003531	0.000001308	0.0002642	0.001057	0.001	0.000001	1

Table B-6. Alphabetical Index of Metric Unit Conversions

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
A			B (Cont)		
Abcoulomb	Statcoulombs	2.998×10^{10}	Baryl	Dyne/sq. cm.	1.000
Acre	Sq. chain (Gunters)	10	Bolt (US Cloth)	Meters	36.576
Acre	Rods	160	BTU	Liter-Atmosphere	10.409
Acre	Square links (Gunters)	1×10^5	Btu	ergs	1.0550×10^{10}
Acre	Hectare or sq.hectometer	0.4047	Btu	foot-lbs	778.3
acres	sq feet	43,560.0	Btu	gram-calories	252.0
acres	sq meters	4,047.	Btu	horsepower-hrs	3.931×10^{-4}
acres	sq miles	1.562×10^{-3}	Btu	joules	1,054.8
acres	sq yards	4,840.	Btu	kilogram-calories	0.2520
acre-feet	cu feet	43,560.0	Btu	kilogram-meters	107.5
acre-feet	gallons	3.259×10^4	Btu	kilowatt-hrs	2.928×10^{-4}
amperes/sq cm	amps/sq in.	6.452	Btu/hr	foot-pounds/sec	0.2162
amperes/sq cm	amps/sq meter	10^4	Btu/hr	gram/cal/sec	0.0700
amperes/sq in.	amps/sq cm	0.1550	Btu/hr	horsepower-hrs	3.929×10^{-4}
amperes/sq in.	amps/sq meter	1,550.0	Btu/hr	watts	0.2931
amperes/sq meter	amps/sq cm	10^{-4}	Btu/min	foot-lbs/sec	12.96
amperes/sq meter	amps/sq in.	6.452×10^{-4}	Btu/min	horsepower	0.02356
ampere-hours	coulombs	3,600.0	Btu/min	kilowatts	0.01757
ampere-hours	faradays	0.03731	Btu/sq ft/min	watts	17.57
ampere-turns	gilberts	1.257	Bucket (Br. dry)	watts/sq in.	0.1221
ampere turns/cm	amp-turns/in.	2.540	bushels	Cubic Cm.	1.818×10^4
ampere-turns/cm	amp-turns/meter	100.0	bushels	cu ft	1.2445
ampere-turns/cm	gilberts/cm	1.257	bushels	cu in.	2,150.4
ampere-turns/in.	amp-turns/cm	0.3937	bushels	cu meters	0.03524
ampere-turns/in.	amp-turns/meter	39.37	bushels	liters	35.24
ampere-turns/in.	gilberts/cm	0.4950	bushels	pecks	4.0
ampere-turns/meter	amp/turns/cm	0.01	bushels	pints (dry)	64.0
ampere-turns/meter	amp-turns/in.	0.0254	bushels	quarts (dry)	32.0
ampere-turns/meter	gilberts/cm	0.01257			
Angstrom unit	Inch	3937×10^{-9}	C		
Angstrom unit	Meter	1×10^{-10}	Calories, gram(mean)	B.T.U. (mean)	3.9685×10^{-3}
Angstrom unit	Micron or (Mu)	1×10^{-4}	Candle/sq. cm	Lamberts	3.142
Are	Acre (US)	0.02471	Candle/sq. inch	Lamberts	0.4870
Ares	sq. yards	119.60	Centares (centiares)	sq meters	1.0
ares	acres	0.02471	Centigrade	Fahrenheit	$(C^\circ \times 9/5) + 32$
ares	sq meters	100.0	centigrams	grams	0.01
Astronomical Unit	Kilometers	1.495×10^8	Centiliter	Ounce fluid (US)	0.3382
Atmospheres	Ton/sq. inch	0.007348	Centiliter	Cubic inch	0.6103
atmospheres	cms of mercury	76.0	Centiliter	drams	2.705
atmospheres	ft of water (at 4°C)	33.90	centiliters	liters	0.01
atmospheres	in. of mercury (at 0°C)	29.92	centimeters	feet	3.281×10^{-2}
atmospheres	kgs/sq cm	1.0333	centimeters	inches	0.3937
atmospheres	kgs/sq meter	10,332	centimeters	kilometers	10^{-5}
atmospheres	pounds/sq in.	14.70	centimeters	meters	0.01
atmospheres	tons/sq ft	1.058	centimeters	miles	6.214×10^{-8}
B			centimeters	millimeters	10.0
Barrels (U.S., dry)	cu. inches	7056.0	centimeters	mils	393.7
Barrels (U.S., dry)	quarts (dry)	105.0	centimeters	yards	1.024×10^{-2}
Barrels (U.S., liquid)	gallons	31.5	centimeter-dynes	cm-grams	1.020×10^{-3}
barrels (oil)	gallons (oil)	42.0	centimeter-dynes	meter-kgs	1.020×10^{-8}
bars	atmospheres	0.9869	centimeter-dynes	pound-feet	7.376×10^{-8}
bars	dynes/sq cm	10^4	centimeter-grams	cm-dynes	980.7
bars	kgs/sq meter	1.020×10^4	centimeter-grams	meter-kgs	10^{-5}
bars	pounds/sq ft	2,089.0	centimeter-grams	pound-feet	7.233×10^{-5}
bars	pounds/sq in.	14.50	centimeters of mercury	atmospheres	0.01316
			centimeters of mercury	feet of water	0.4461
			centimeters of mercury	kgs/sq meter	136.0

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
C (Cont)			C (Cont)		
centimeters of mercury	pounds/sq ft	27.85	cubic inches	gallons	4.329×10^{-3}
centimeters of mercury	pounds/sq in.	0.1934	cubic inches	liters	0.01639
centimeters/sec	feet/min	1.1969	cubic inches	mil-feet	1.061×10^5
centimeters/sec	feet/sec	0.03281	cubic inches	pints(U.S. liq.)	0.03463
centimeters/sec	kilometers/hr	0.036	cubic inches	quarts(U.S. liq.)	0.01732
centimeters/sec	knots	0.1943	cubic meters	bushels (dry)	28.38
centimeters/sec	miles/hr	0.02237	cubic inches	cu yards	2.143×10^{-5}
centimeters/sec	miles/min	3.728×10^{-4}	cubic meters	cu cms	10^4
centimeters/sec/sec	feet/sec/sec	0.03281	cubic meters	cu feet	35.31
centimeters/sec/sec	kms/hr/sec	0.036	cubic meters	cu inches	61,023.0
centimeters/sec/sec	meters/sec/sec	0.01	cubic meters	cu yards	1.308
centimeters/sec/sec	miles/hr/sec	0.02237	cubic meters	gallons (U.S. liq.)	264.2
Chain	Inches	792.00	cubic meters	liters	1,000.0
Chain	meters	20.12	cubic meters	pints(U.S. liq.)	2,113.0
Chains (surveyors' or Gunter's)	yards	22.00	cubic meters	quarts (U.S. liq.)	1,057.0
circular mils	sq cms	5.067×10^{-6}	cubic yards	cu cms	7.646×10^5
circular mils	sq mils	0.7854	cubic yards	cu feet	27.0
Circumference	Radians	6.283	cubic yards	cu inches	46,656.0
circular mils	sq inches	7.854×10^{-7}	cubic yards	cu meters	0.7646
Cords	cord feet	8	cubic yards	gallons (U.S. liq.)	202.0
Cord feet	cu. feet	16	cubic yards	liters	764.6
Coulomb	Statcoulombs	2.998×10^9	cubic yards	pints (U.S. liq.)	1,615.9
coulombs	faradays	1.036×10^{-5}	cubic yards/min	quarts (U.S. liq.)	807.9
coulombs/sq cm	coulombs/sq in.	64.52	cubic yards/min	cubic ft/sec	0.45
coulombs/sq cm	coulombs/sq meter	10^4	cubic yards/min	gallons/sec	3.367
coulombs/sq in.	coulombs/sq cm	0.1550	cubic yards/min	liters/sec	12.74
coulombs/sq in.	coulombs/sq meter	1,550.0	D		
coulombs/sq meter	coulombs/sq cm	10	Dalton	Gram	1.650×10^{-24}
coulombs/sq meter	coulombs/sq in.	6.452×10^{-4}	days	seconds	86,400.0
cubic centimeters	cu feet	3.531×10^{-5}	decigrams	grams	0.1
cubic centimeters	cu inches	0.06102	deciliters	liters	0.1
cubic centimeters	cu meters	10^{-6}	decimeters	meters	0.1
cubic centimeters	cu yards	1.308×10^{-6}	degrees (angle)	quadrants	0.01111
cubic centimeters	gallons (U.S. liq.)	2.642×10^{-4}	degrees (angle)	radians	0.01745
cubic centimeters	liters	0.001	degrees (angle)	seconds	3,600.0
cubic centimeters	pints (U.S. liq.)	2.113×10^{-3}	degrees/sec	radians/sec	0.01745
cubic centimeters	quarts (U.S. liq.)	1.057×10^{-3}	degrees/sec	revolutions/min	0.1667
cubic feet	bushels (dry)	0.8036	degrees/sec	revolutions/sec	2.778×10^{-3}
cubic feet	cu cms	28,320.0	dekagrams	grams	10.0
cubic feet	cu inches	1,728.0	dekaliters	liters	10.0
cubic feet	cu meters	0.02832	dekameters	meters	10.0
cubic feet	cu yards	0.03704	Drams (apothecaries' or troy)	ounces (avoirdupois)	0.1371429
cubic feet	gallons (U.S. liq.)	7.48052	Drams (apothecaries' or troy)	ounces (troy)	0.125
cubic feet	liters	28.32	Drams (U.S., fluid or apoth.)	cubic cm.	3.6967
cubic feet	pints (U.S. liq.)	59.84	drams	grams	1.7718
cubic feet	quarts (U.S. liq.)	29.92	drams	grains	27.3437
cubic feet/min	cu cms/sec	472.0	drams	ounces	0.0625
cubic feet/min	gallons/sec	0.1247	Dyne/cm	Erg/sq. millimeter	0.01
cubic feet/min	liters/sec	0.4720	Dyne/sq. cm.	Atmospheres	9.869×10^{-7}
cubic feet/min	pounds of water/min	62.43	Dyne/sq. cm.	Inch of Mercury at 0°C	2.953×10^{-5}
cubic feet/sec	million gals/day	0.646317	Dyne/sq.cm.	Inch of Water at 4°C	4.015×10^{-4}
cubic feet/sec	gallons/min	448.831	Dyne/sq.cm.	dynes	1.020×10^{-3}
cubic inches	cu cms	16.39	Dynes	joules/cm	10^{-7}
cubic inches	cu feet	5.787×10^{-4}	Dynes	joules/meter (newtons)	10^{-5}
cubic inches	cu meters	1.639×10^{-5}			
cubic inches	cu yards	2.143×10^{-5}			

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
D (Cont)			F (Cont)		
dynes	kilograms	1.020×10^{-6}	feet/sec	kms/hr	1.097
dynes	poundals	7.233×10^{-5}	feet/sec	knots	0.5921
dynes	pounds	2.248×10^{-6}	feet/sec	meters/min	18.29
dynes/sq cm	bars	10^{-6}	feet/sec	miles/hr	0.6818
E			feet/sec	miles/min	0.01136
Ell	Cm.	114.30	feet/sec	cms/sec	30.48
Ell	Inches	45	feet/sec	cms/sec/sec	30.48
Em, Pica	Inch	0.167	feet/sec	kms/hr/sec	1.097
Em, Pica	Cm.	0.4233	feet/sec	meters/sec/sec	0.3048
Erg/sec	Dyne - cm/sec	1.000	feet/sec	miles/hr/sec	0.6818
ergs	Btu	9.480×10^{-11}	feet/100 feet	per cent grade	1.0
ergs	dyne-centimeters	1.0	Foot - candle	Lumen/sq. meter	10.764
ergs	foot-pounds	7.367×10^{-8}	foot-pounds	Btu	1.286×10^{-3}
ergs	gram-calories	0.2389×10^{-7}	foot-pounds	ergs	1.356×10^7
ergs	gram-cms	1.020×10^{-3}	foot-pounds	gram-calories	0.3238
ergs	horsepower-hrs	3.7250×10^{-14}	foot-pounds	hp-hrs	5.050×10^{-7}
E (Cont)			foot-pounds	joules	1.356
ergs	joules	10^{-7}	foot-pounds	kg-calories	3.24×10^{-4}
ergs	kg-calories	2.389×10^{-11}	foot-pounds	kg-meters	0.1383
ergs	kg-meters	1.020×10^{-8}	foot-pounds	kilowatt-hrs	3.766×10^{-7}
ergs	kilowatt-hrs	0.2778×10^{-13}	foot-pounds/min	Btu/min	1.286×10^{-3}
ergs	watt-hours	0.2778×10^{-18}	foot-pounds/min	foot-pounds/sec	0.01667
ergs/sec	Btu/min	5.688×10^{-6}	foot-pounds/min	horsepower	3.030×10^{-5}
ergs/sec	ft-lbs/min	4.427×10^{-6}	foot-pounds/min	kg-calories/min	3.24×10^{-4}
ergs/sec	ft-lbs/sec	7.3756×10^{-8}	foot-pounds/min	kilowatts	2.260×10^{-5}
ergs/sec	horsepower	1.341×10^{-10}	foot-pounds/sec	Btu/hr	4.6263
ergs/sec	kg-calories/min	1.433×10^{-9}	foot-pounds/sec	Btu/min	0.07717
ergs/sec	kilowatts	10^{-10}	foot-pounds/sec	horsepower	1.818×10^{-3}
F			foot-pounds/sec	kg-calories/min	0.01945
farads	microfarads	10^6	foot-pounds/sec	kilowatts	1.356×10^{-3}
Faraday/sec	Ampere (absolute)	9.6500×10^4	foot-pounds/sec	miles(U.S.)	0.125
faradays	ampere-hours	26.80	foot-pounds/sec	rods	40.0
faradays	coulombs	9.649×10^4	foot-pounds/sec	furlongs	660.0
Fathom	Meter	1.828804	G		
fathoms	feet	6.0	gallons	cu cms	3,785.0
feet	centimeters	30.48	gallons	cu feet	0.1337
feet	kilometers	3.048×10^{-4}	gallons	cu inches	231.0
feet	meters	0.3048	gallons	cu meters	3.785×10^{-3}
feet	miles (naut.)	1.645×10^{-4}	gallons	cu yards	4.951×10^{-3}
feet	miles (stat.)	1.894×10^{-4}	gallons	liters	3.785
feet	millimeters	304.8	gallons (liq Br. Imp.)	gallons (U.S. liq.)	1.20095
feet	mils	1.2×10^4	gallons/min	gallons (Imp.)	0.83267
feet of water	atmospheres	0.02950	gallons/min	pounds of water	8.3453
feet of water	in. of mercury	0.8826	gausses	cu ft/sec	2.228×10^{-3}
feet of water	kgs/sq cm	0.03048	gausses	liters/sec	0.06308
feet of water	kgs/sq meter	304.8	gausses	cu ft/hr	8.0208
feet of water	pounds/sq ft	62.43	gausses	lines/sq in.	6.452
feet of water	pounds/sq in	0.4335	gausses	webers/sq cm	10^{-8}
feet/min	cms/sec	0.5080	gausses	webers/sq in.	6.452×10^{-8}
feet/min	feet/sec	0.01667	gilberts	webers/sq meter	10^{-4}
feet/min	kms/hr	0.01829	gilberts/cm	ampere-turns	0.7958
feet/min	meters/min	0.3048	gilberts/cm	amp-turns/cm	0.7958
feet/min	miles/hr	0.01136	gilberts/cm	amp-turns/in	2.021
feet/sec	cms/sec	30.48	gilberts/cm	amp-turns/meter	79.58

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
G (Cont)			H (Cont)		
Grade	Radian	0.01571	horsepower	horsepower (metric)	1.014
Grains	drams (avoirdupois)	0.03657143	(550 ft lb/sec)	(542.5 ft lb/sec)	
grains (troy)	grains (avdp)	1.0	horsepower	kg-calories/min	10.68
grains (troy)	grams	0.06480	horsepower	kilowatts	0.7457
grains (troy)	ounces (avdp)	2.0833 X 10 ⁻³	horsepower	watts	745.7
grains (troy)	pennyweight (troy)	0.04167	horsepower (boiler)	Btu/hr	33.479
grains/U.S. gal	parts/million	17.118	horsepower (boiler)	kilowatts	9.803
grains/U.S. gal	pounds/million gal	142.86	horsepower-hrs	Btu	2,547.0
grains/Imp. gal	parts/million	14.286	horsepower-hrs	ergs	2.6845 X 10 ¹³
grams	dynes	980.7	horsepower-hrs	foot-lbs	1.98 X 10 ⁴
grams	grains	15.43	horsepower-hrs	gram-calories	641,190.0
grams	joules/cm	9.807 X 10 ⁻⁵	horsepower-hrs	joules	2.684 X 10 ⁴
grams	joules/meter (newtons)	9.807 X 10 ⁻³	horsepower-hrs	kg-calories	641.1
grams	kilograms	0.001	horsepower-hrs	kg-meters	2.737 X 10 ⁵
grams	milligrams	1.000.0	horsepower-hrs	kilowatts-hrs	0.7457
grams	ounces (avdp)	0.03527	hours	days	4.167 X 10 ⁻²
grams	ounces (troy)	0.03215	hours	weeks	5.952 X 10 ⁻³
grams	poundals	0.07093	Hundredweights (long)	pounds	112
grams	pounds	2.205 X 10 ⁻³	Hundredweights (long)	tons (long)	0.05
grams/cm	pounds/inch	5.600 X 10 ⁻³	Hundredweights (short)	ounces (avoirdupois)	1600
grams/cu cm	pounds/cu ft	62.43	Hundredweights (short)	pounds	100
grams/cu cm	pounds/cu in	0.03613	Hundredweights (short)	tons (metric)	0.0453592
grams/cu cm	pounds/mil-foot	3.405 X 10 ⁻⁷	Hundredweights (short)	tons (long)	0.0446429
grams/liter	grains/gal	58.417	I		
grams/liter	pounds/1,000 gal	8.345	inches	centimeters	2.540
grams/liter	pounds/cu ft	0.062427	inches	meters	2.540 X 10 ⁻²
grams/liter	parts/million	1,000.0	inches	miles	1.578 X 10 ⁻⁵
grams/sq cm	pounds/sq ft	2.0481	inches	millimeters	25.40
gram-calories	Btu	3.9683 X 10 ⁻³	inches	mils	1,000.0
gram-calories	ergs	4.1868 X 10 ⁷	inches	yards	2.778 X 10 ⁻²
gram-calories	foot-pounds	3.0880	inches of mercury	atmospheres	0.03342
gram-calories	horsepower-hrs	1.5596 X 10 ⁻⁶	inches of mercury	feet of water	1.133
gram-calories	kilowatt-hrs	1.1630 X 10 ⁻⁶	inches of mercury	kgs/sq cm	0303453
gram-calories	watt-hrs	1.1630 X 10 ⁻³	inches of mercury	kgs sq meter	345.3
grams-calories/sec	Btu/hr	14.286	inches of mercury	pounds/sq ft	70.73
gram-centimeters	Btu	9.297 X 10 ⁻⁸	inches of mercury	pounds/sq in.	0.4912
gram-centimeters	ergs	980.7	inches of water (at 4°C)	atmospheres	2.458 X 10 ⁻³
gram-centimeters	joules	9.807 X 10 ⁻⁵	inches of water (at 4°C)	inches of mercury	0.07355
gram-centimeters	kg-cal	2.343 X 10 ⁻⁸	inches of water (at 4°C)	kgs/sq cm	2.540 X 10 ⁻³
gram-centimeters	kg-meters	10 ⁻⁵	inches of water (at 4°C)	ounces/sq in.	0.5781
H			inches of water (at 4°C)	pounds/sq ft	5.204
Hand	Cm.	10.16	inches of water (at 4°C)	pounds/sq in.	0.03613
hectares	acres	2.471	International Ampere	Ampere (absolute)	0.9998
hectares	sq feet	1.076 X 10 ⁵	International Volt	Volts (absolute)	1.0003
hectograms	grams	100.0	International volt	Joules (absolute)	1-593 X 10 ⁻¹⁹
hectoliters	liters	100.0	International volt	Joules	9.654 X 10 ⁴
hectometers	meters	100.0	J		
hectowatts	watts	100.0	joules	Btu	9.480 X 10 ⁻⁴
henries	millihenries	1,000.0	joules	ergs	10 ⁷
Hogsheads (British)	cubic ft.	10.114	joules	foot-pounds	0.7376
Hogsheads (U.S.)	cubic ft.	8.42184	joules	kg calories	2.389 X 10 ⁻⁴
Hogsheads (U.S.)	gallons (U.S.)	63	joules	kg-meters	0.1020
horsepower	Btu/min	42.44	joules	watt-hrs	2.778 X 10 ⁻⁴
horsepower	foot-lbs/min	33,000.0	joules/cm	grams	1.020 X 10 ⁴
horsepower	foot-lbs/sec	550.0	joules/cm	dynes	10 ⁷
horsepower (metric)	horsepower	0.9863			
(542.5 ft lb/sec)	(550 ft lb/sec)				

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
J (Cont)			K (Cont)		
joules/cm	joules/meter (newtons)	100.0	kilometers/hr/sec	cms/sec/sec	27.78
joules/cm	poundals	723.3	kilometers/hr/sec	ft/sec/sec	0.9113
joules/cm	pounds	22.48	kilometers/hr/sec	meters/sec/sec	0.2778
K			kilometers/hr/sec	miles/hr/sec	0.6214
kilograms	dynes	980,665.0	kilowatts	Btu/min	56.92
kilograms	grams	1,000.0	kilowatts	foot-lbs/min	4,426 X 10 ⁴
kilograms	joules/cm	0.09807	kilowatts	foot-lbs/sec	737.6
kilograms	joules/meter (newtons)	9.807	kilowatts	horsepower	1.341
kilograms	poundals	70.93	kilowatts	kg-calories/min	14.34
kilograms	pounds	2.205	kilowatts	watts	1,000.0
kilograms	tons (long)	9.842 X 10 ⁻⁴	kilowatt-hrs	Btu	3,413.0
kilograms	tons (short)	1.102 X 10 ⁻³	kilowatt-hrs	ergs	3,600 X 10 ¹³
kilograms/cu meter	grams/cu cm	0.001	kilowatt-hrs	foot-lbs	2,655 X 10 ⁴
kilograms/cu meter	pounds/cu ft	0.06243	kilowatt-hrs	gram-calories	859,850.0
kilograms/cu meter	pounds/cu in.	3.613 X 10 ⁻⁵	kilowatt-hrs	horsepower-hrs	1.341
kilograms/cu meter	pounds/mil-foot	3.405 X 10 ⁻¹⁰	kilowatt-hrs	joules	3.6 X 10 ⁴
kilograms/meter	pounds/ft	0.6720	kilowatt-hrs	kg-calories	860.5
Kilogram/sq. cm.	Dynes	980,665	kilowatt-hrs	kg-meters	3.671 X 10 ⁵
kilograms/sq cm	atmospheres	0.9678	pounds of water evaporated from and at 212°F		
kilograms/sq cm	feet of water	32.81	pounds of water raised from 62° to 212°F		
kilograms/sq cm	inches of mercury	28.96	knots	feet/hr	6,080.0
kilograms/sq cm	pounds/sq ft	2,048.0	knots	kilometers/hr	1.8532
kilograms/sq cm	pounds/sq in.	14.22	knots	nautical miles/hr	1.0
kilograms/sq meter	atmospheres	9.678 X 10 ⁻⁵	knots	statute miles/hr	1.151
kilograms/sq meter	bars	98.07 X 10 ⁻⁶	knots	yards/hr	2,027.0
kilograms/sq meter	feet of water	3.281 X 10 ⁻³	knots	feet/sec	1.689
kilograms/sq meter	inches of mercury	2.896 X 10 ⁻³	L		
kilograms/sq meter	pounds/sq ft	0.2048	league		
kilograms/sq meter	pounds/sq in.	1.422 X 10 ⁻³	miles(approx.)		
kilograms/sq mm	kgs/sq meter	10 ⁶	Miles		
kilogram-calories	Btu	3.968	Kilometers		
kilogram-calories	foot-pounds	3,088	gausses		
kilogram-calories	hp-hrs	1.560 X 10 ⁻³	gausses		
kilogram-calories	joules	4,186	webers/sq cm		
kilogram-calories	kg-meters	426.9	webers/sq in.		
kilogram-calories	kilojoules	4.186	webers/sq in.		
kilogram-calories	kilowatt-hrs	1.163 X 10 ⁻³	webers/sq meter		
kilogram meters	Btu	9.294 X 10 ⁻³	links (engineer's)		
kilogram meters	ergs	9.804 X 10 ⁷	links (surveyor's)		
kilogram meters	foot-pounds	7.233	inches		
kilogram meters	joules	9.804	inches		
kilogram meters	kg-calories	2.342 X 10 ⁻³	liters		
kilogram meters	kilowatt-hrs	2.723 X 10 ⁻⁶	liters		
kilolines	maxwells	1,000.0	liters		
kiloliters	liters	1,000.0	liters		
kilometers	centimeters	10 ⁵	liters		
kilometers	feet	3,281.0	liters		
kilometers	inches	3.937 X 10 ⁴	liters		
kilometers	meters	1,000.0	liters		
kilometers	miles	0.6214	liters		
kilometers	millimeters	10 ⁶	liters		
kilometers	yards	1,094.0	liters/min		
kilometers/hr	cms/sec	27.78	liters/min		
kilometers/hr	feet/min	54.68	lumens/sq ft		
kilometers/hr	feet/sec	0.9113	Lumen		
kilometers/hr	knots	0.5396	Lumen		
kilometers/hr	meters/min	16.67	Lumen/sq. ft.		
kilometers/hr	miles/hr	0.6214	lux		

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
M					
maxwells	kilolines	0.001	miles/hr/sec	cms/sec/sec	44.70
maxwells	webers	10 ⁻³	miles/hr/sec	feet/sec/sec	1.467
megalines	maxwells	10 ⁴	miles/hr/sec	kms/hr/sec	1.609
megohms	microhms	10 ¹²	miles/hr/sec	meters/sec/sec	0.4470
megohms	ohms	10 ⁶	miles/min	cms/sec	2,682.0
meters	centimeters	100.0	miles/min	feet/sec	88.0
meters	feet	3.281	miles/min	kms/minn	1.609
meters	inches	39.37	miles/min	knots/min	0.8684
meters	kilometers	0.001	miles/min	miles/hr	60.0
meters	miles (stat.)	6.214 X 10 ⁻⁴	mil-feet	cu inches	9.425 X 10 ⁻⁶
meters	millimeters	1,000.0	milliers	kilograms	1,000.0
meters	yards	1.094	Millimicrons	meters	1 X 10 ⁻⁹
meters	yards	1.179	Milligrams	grains	0.01543236
meters/min	cms/sec	1.667	milligrams	grams	0.001
meters/min	feet/min	3.281	milligrams/liter	parts/million	1.0
meters/min	feet/sec	0.05468	millihenries	henries	0.001
meters/min	kms/hr	0.06	milliliters	liters	0.001
meters/min	knots	0.03238	millimeters	centimeters	0.1
meters/min	miles/hr	0.03728	millimeters	feet	3.281 X 10 ⁻³
meters/sec	feet/min	196.8	millimeters	inches	0.03937
meters/sec	feet/sec	3.281	millimeters	kilometers	10 ⁻⁶
meters/sec	kilometers/hr	3.6	millimeters	meters	0.001
meters/sec	kilometers/min	0.06	millimeters	miles	6.214 X 10 ⁻⁷
meters/sec	miles/hr	2.237	millimeters	mils	39.37
meters/sec	miles/min	0.03728	millimeters	yards	1.094 X 10 ⁻³
meters/sec/sec	cms/sec/sec	100.0	million gals/day	cu ft/sec	1.54723
meters/sec/sec	ft/sec/sec	3.281	mils	centimeters	2.540 X 10 ⁻³
meters/sec/sec	kms/hr/sec	3.6	mils	feet	8.333 X 10 ⁻⁵
meters/sec/sec	miles/hr/sec	2.237	mils	inches	0.001
meter-kilograms	cm-dynes	9.807 X 10 ⁷	mils	kilometers	2.540 X 10 ⁻⁸
meter-kilograms	cm-grams	10 ⁵	mils	yards	2.778 X 10 ⁻⁵
meter-kilograms	pound-feet	7.233	miner's inches	cu ft/min	1.5
microfarad	farads	10 ⁻⁶	Minims (British)	cubic cm.	0.059192
micrograms	grams	10 ⁻⁶	Minims (U.S., fluid)	cubic cm.	0.061612
microhms	megohms	10 ⁻¹²	minutes (angles)	degrees	0.01667
microhms	ohms	10 ⁻⁶	minutes (angles)	quadrants	1.852 X 10 ⁻⁴
microliters	liters	10 ⁻⁶	minutes (angles)	radians	2.909 X 10 ⁻⁴
Microns	meters	1 X 10 ⁻⁶	minutes (angles)	seconds	60.0
miles (naut.)	feet	6,080.27	myriagrams	kilograms	10.0
miles (naut.)	kilometers	1.853	myriameters	kilometers	10.0
miles (naut.)	meters	1,853.0	myriawatts	kilowatts	10.0
miles (naut.)	miles (statute)	1.1516			
miles (naut.)	yards	2,027.0			
miles (statute)	centimeters	1.609 X 10 ⁵			
miles (statute)	feet	5,280.0	nepers	decibels	8.686
miles (statute)	inches	6.336 X 10 ⁴	Newton	Dynes	1 X 10 ⁵
miles (statute)	kilometers	1.609			
miles (statute)	meters	1,609.0			
miles (statute)	miles (naut.)	0.8684			
miles (statute)	yards	1,760.0			
miles/hr	cms/sec.	44.70	OHM (International)	OHM (absolute)	1.0005
miles/hr	feet/min	88.0	ohms	megohms	10 ⁻⁶
miles/hr	feet/sec	1.467	ohms	microhms	10 ⁶
miles/hr	kms/hr	1.609	ounces	drams	16.0
miles/hr	kms/min	0.02682	ounces	grains	437.5
miles/hr	kms/min	0.02682	ounces	grams	28.349527
miles/hr	knots	0.8684	ounces	pounds	0.0625
miles/hr	meters/min	26.82	ounces	ounces (troy)	0.9115
miles/hr	miles/min	0.1667	ounces	tons (long)	2.790 X 10 ⁻⁵
			ounces	tons (metric)	2.835 X 10 ⁻⁵
N					
O					

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
O (Cont)			P (Cont)		
ounces (fluid)	cu inches	1.805	pounds (troy)	grams	373.24177
ounces (fluid)	liters	0.02957	pounds (troy)	ounces (avdp.)	13.1657
ounces (troy)	grains	480.0	pounds (troy)	pennyweights (troy)	240.0
ounces (troy)	grams	31.103481	pounds (troy)	pounds (avdp.)	0.822857
ounces (troy)	ounces (avdp)	1.09714	pounds (troy)	tons (long)	3.6735 X 10 ⁻⁴
ounces (troy)	pennyweights (troy)	20.0	pounds (troy)	tons (metric)	3.7324 X 10 ⁻⁴
ounces (troy)	pounds (troy)	0.08333	pounds (troy)	tons (short)	4.1143 X 10 ⁻⁴
Ounce/sq. inch	Dynes/sq cm	0.4309	pounds of water	cu feet	0.01602
ounces/sq in.	pounds/sq in.	0.0625	pounds of water	cu inches	27.68
			pounds of water/min	cu ft/sec	2.670 X 10 ⁻⁴
			pound-feet	cm-dynes	1.356 X 10 ⁷
			pound-feet	cm-grams	13.825.0
			pound-feet	meter-kgs	0.1383
			pounds/cu ft	grams/cu cm	0.01602
			pounds/cu ft	kgs/cu meter	16.02
			pounds/cu ft	pounds/cu in.	5.787 X 10 ⁻⁴
			pounds/cu ft	pounds/mil-loot	5.456 X 10 ⁻⁹
Parsec	Miles	19 X 10 ¹²	pounds/cu in.	gms/cu cm	27.68
Parsec	Kilometers	3.084 X 10 ¹³	pounds/cu in.	kgs/cu meter	2.768 X 10 ⁴
part-/million	grains/U.S. gal	0.0584	pounds/cu in.	pounds/cu ft	1,728.0
parts/million	grains/Imp. gal	0.07016	pounds/cu in.	pounds/mil-foot	9.425 X 10 ⁻⁶
parts/million	pounds/million gal	8.345	pounds/cu in.	kgs-meter	1.488
Pecks (British)	cubic inches	554.6	pounds/ft	gms/cm	178.6
Pecks (British)	liters	9.091901	pounds/mil-foot	gms/cu cm	2.306 X 10 ⁶
Pecks (U.S.)	bushels	0.25	pounds/sq ft	atmospheres	4.725 X 10 ⁻⁴
Pecks (U.S.)	cubic inches	37.605	pounds/sq ft	feet of water	0.01602
Pecks (U.S.)	liters	8.809582	pounds/sq ft	inches of mercury	0.01414
Pecks (U.S.)	quarts (dry)	8	pounds/sq ft	kgs/sq meter	4.882
pennyweights (troy)	grains	24.0	pounds/sq ft	pounds/sq in.	6.944 X 10 ⁻³
pennyweights (troy)	ounces (troy)	0.05	pounds/sq in.	atmospheres	0.06804
pennyweights (troy)	grams	1.55517	pounds/sq in.	feet of water	2.307
pennyweights (troy)	pounds (troy)	4.1667 X 10 ⁻³	pounds/sq in.	inches of mercury	2.036
pints (dry)	cu inches	33.60	pounds/sq in.	kgs/sq meter	703.1
pints (liq.)	cu cms.	473.2	pounds/sq in.	pounds/sq ft	144.0
pints (liq.)	cu feet	0.01671			
pints (liq.)	cu inches	28.87			
pints (liq.)	cu meters	4.732 X 10 ⁻⁴			
pints (liq.)	cu yards	6.189 X 10 ⁻⁴			
pints (liq.)	gallons	0.125			
pints (liq.)	liters	0.4732			
pints (liq.)	quarts (liq.)	0.5			
Planck's quantum	Erg second	6.624 X 10 ⁻²⁷			
Poise	Gram/cm. sec.	1.00			
Pounds (avoirdupois)	ounces (troy)	14.5833	quadrants (angle)	degrees	90.0
poundals	dynes	13,826.0	quadrants (angle)	minutes	5,400.0
poundals	grams	14.10	quadrants (angle)	radians	1.571
poundals	joules/cm	1.383 X 10 ⁻³	quadrants (angle)	seconds	3.24 X 10 ⁵
poundals	joules/meter (newtons)	0.1383	quarts (dry)	cu inches	67.20
poundals	kilograms	0.01410	quarts (liq.)	cu cms	946.4
poundals	pounds	0.03108	quarts (liq.)	cu feet	0.03342
pounds	drams	256.0	quarts (liq.)	cu inches	57.75
pounds	dynes	44.4823 X 10 ⁴	quarts (liq.)	cu meters	9.464 X 10 ⁻⁴
pounds	grains	7,000.0	quarts (liq.)	cu yards	1.238 X 10 ⁻³
pounds	grams	453.5924	quarts (liq.)	gallons	0.25
pounds	joules/cm	0.04448	quarts (liq.)	liters	0.9463
pounds	joules/meter (newtons)	4.448			
pounds	kilograms	0.4536			
pounds	ounces	16.0			
pounds	ounces (troy)	14.5833	radians	degrees	57.30
pounds	poundals	32.17	radians	minutes	3,438.0
pounds	pounds (troy)	1.21528	radians	quadrants	0.6366
pounds	tons (short)	0.0005	radians	seconds	2.063 X 10 ⁵
pounds (troy)	grains	5,760.0	radians/sec	degrees/sec	57.30
			radians/sec	revolutions/min	9.549

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY
R (Cont)			S (Cont)		
radians/sec	revolutions/sec	0.1592	square kilometers	sq meters	10^6
radians/sec/sec	revs/min/min	573.0	square kilometers	sq miles	0.3861
radians/sec/sec	revs/min/sec	9.549	square kilometers	sq yards	1.196×10^6
radians/sec/sec	revs/sec/sec	0.1592	square meters	acres	2.471×10^{-4}
revolutions	degrees	360.0	square meters	sq cms	10^4
revolutions	quadrants	4.0	square meters	sq feet	10.76
revolutions	radians	6.283	square meters	sq inches	1,550.0
revolutions/min	degrees/sec	6.0	square meters	sq miles	3.861×10^{-7}
revolutions/min	radians/sec	0.1047	square meters	sq millimeters	10^6
revolutions/min	revs/sec	0.01667	square meters	sq yards	1.196
revolutions/miri/min	radians/sec/sec	1.745×10^{-3}	square miles	acres	640.0
revolutions/min/min	revs/min/sec	0.01667	square miles	sq feet	27.88×10^6
revolutions/min/min	revs/sec/sec	2.778×10^{-4}	square miles	sq kms	2.590
revolutions/sec	degrees/sec	360.0	square miles	sq meters	2.590×10^6
revolutions/sec	radians/sec	6.283	square miles	sq yards	3.098×10^6
revolutions/sec	revs/min	60.0	square miles	circular mils	1,973.0
revolutions/sec/sec	radians/sec/sec	6.283	square millimeters	sq cms	0.01
revolutions/sec/sec	revs/min/min	3,600.0	square millimeters	sq feet	1.076×10^{-5}
revolutions/sec/sec	revs/min/sec	60.0	square millimeters	sq inches	1.550×10^{-3}
Rod	Chain (Gunters)	0.25	square millimeters	square mils	1.273
Rod	Meters	5.029	square mils	sq cms	6.452×10^6
Rods (Surveyors' meas.)	yards	5.5	square mils	sq inches	10^{-6}
rods	feet	16.5	square yards	acres	2.066×10^{-4}
S			square yards	sq cms	8,361.0
Scraples	grains	20	square yards	sq feet	9.0
seconds (angle)	degrees	2.778×10^{-4}	square yards	sq inches	1,296.0
seconds (angle)	minutes	0.01667	square yards	sq meters	0.8361
seconds (angle)	quadrants	3.087×10^{-6}	square yards	sq miles	3.228×10^{-7}
seconds (angle)	radians	4.848×10^{-6}	square yards	sq millimeters	$8,361 \times 10^5$
Slug	Kilogram	14.59	T		
Slug	Pounds	32.17	temperature	absolute	1.0
Sphere	Steradians	12.57	(°C) +273	temperature (°C)	
square centimeters	circular mils	1.973×10^5	temperature	temperature (°F)	1.8
square centimeters	sq feet	1.076×10^{-3}	(°C) +17.78		
square centimeters	sq inches	0.1550	temperature	absolute	1.0
square centimeters	sq meters	0.0001	(°F) +460	temperature (°F)	
square centimeters	sq miles	3.861×10^{-11}	temperature	temperature (°C)	5/9
square centimeters	sq millimeters	100.0	(°F)32		
square centimeters	sq yards	1.196×10^{-4}	tons (long)	kilograms	1,016.0
square feet	acres	2.296×10^{-5}	tons (long)	pounds	2,240.0
square feet	sq cms	929.0	tons (long)	tons (short)	1.120
square feet	sq inches	144.0	tons (metric)	kilograms	1,000.0
square feet	sq meters	0.09290	tons (metric)	pounds	2,205.0
square feet	sq miles	3.587×10^{-6}	tons (short)	kilograms	907.1848
square feet	sq millimeters	9.290×10^4	tons (short)	ounces	32,000.0
square feet	sq yards	0.1111	tons (short)	ounces (troy)	29,166.66
square inches	circular mils	1.273×10^6	tons (short)	pounds	2,000.0
square inches	sq cms	6.452	tons (short)	pounds (troy)	2,430.56
square inches	sq feet	6.944×10^{-3}	tons (short)	tons (long)	0.89287
square inches	sq millimeters	645.2	tons (short)	tons (metric)	0.9078
square inches	sq mils	10.6	tons (short)	kgs/sq meter	9,765.0
square inches	sq yards	7.716×10^{-4}	tons (short)/sq ft	pounds/sq in.	2,000.0
square kilometers	acres	247.1	tons (short)/sq ft	pounds of water/hr	83.333
square kilometers	sq cms	10.10	tons of water/24 hrs	gallons/min	0.16643
square kilometers	sq ft	10.76×10^6	tons of water/24 hrs	cu ft/hr	1.3349
square kilometers	sq inches	1.550×10^9	tons of water/24 hrs		

Table B-6. Alphabetical Index of Metric Unit Conversions (Cont)

TO CONVERT	INTO	MULTIPLY BY	TO CONVERT	INTO	MULTIPLY BY		
V					W (Cont)		
Volt/inch	Volt/cm.	0.39370	watt-hours	kilogram-meters	367.2		
Volt (absolute)	Statvolts	0.003336	watt-hours	kilowatt-hrs	0.001		
W					Y		
watts	Btu/hr	3.4129	webers	maxwells	10 ⁸		
watts	Btu/min	0.05688	webers	kilolines	10 ⁵		
Watts	ergs/sec	107.0	webers/sq in.	gausses	1.550 X 10 ⁷		
watts	foot-lbs/min	44.27	webers/sq in.	lines/sq in.	10 ⁸		
watts	foot-lbs/sec	0.7378	webers/sq in	webers/sq cm	0.1550		
watts	horsepower	1.341 X 10 ⁻³	webers/sq meter	webers/sq meter	1,550.0		
watts	horsepower (metric)	1.360 X 10 ⁻³	webers/sq meter	gausses	10 ⁴		
watts	kg-calories/min	0.01433	webers/sq meter	lines/sq in.	6.452 X 10 ⁴		
watts	kilowatts	0.001	webers/sq meter	webers/sq cm	10 ⁻⁴		
Watts (Abs.)	B.T.U. (mean)/min.	0.056884	webers/sq meter	webers/sq in.	6.452 X 10 ⁻⁴		
Watts (Abs.)	joules/sec.	1	Y				
watt-hours	Btu	3.413	yards	centimeters	91.44		
watt-hours	ergs	3.60 X 10 ¹⁰	yards	kilometers	9.144 X 10 ⁻⁴		
watt-hours	foot-pounds	2,656.0	yards	meters	0.9144 X 10 ⁻⁴		
watt-hours	gram-calories	859.85	yards	miles (naut.)	4.934 X 10 ⁻⁴		
watt-hours	horsepower-hrs	1.341 X 10 ⁻³	yards	miles (stat.)	5.682 X 10 ⁻⁴		
watt-hours	kilogram-calories	0.8605	yards	millimeters	914.4		

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APPENDIX C

Appendix C lists the part name, part number and NIIN number of equipment, materials or supplies used in this manual and which are not listed in any IPB. This appendix lists the part name in alphabetical order.

Item Number	Part Number	NIIN Number
Abrasive Mat	MIL-A-9962	00-967-5093
Adhesive, Polyurethane	UR-1092	LH-000-1650
Battery, Manganese Dioxide	849AS103 (FW14)	01-334-0724
Brush, Disposable	A-A-289/H-B-643	00-514-2417
Cap, Snap Fastener	M527981-1B	00-276-4954
Cap, Uni-Directional Snap Fastener	MS27983-1	00-891-9073
Cement, Polychloroprene	MIL-A-5540	00-142-9913
Cloth, Aramid, Green	MIL-C-83429	01-147-2064
Cloth, Lint Free	MIL-C-85043	00-044-9281
Cloth, Nylon, Polychloroprene-Coated, Sage Green	MIL-C-19002	00-935-1759
Cloth, Nylon, Polychloroprene-Coated, Yellow	MIL-C-19002	00-935-6427
Cloth, Nylon, Polychloroprene-Coated, Orange	MIL-C-19002	00-060-9136
Cloth, Nylon, Polyurethane-Coated, Typ 1	MIL-C-83489	01-335-3129
Cord, Nylon, Typ 3	MIL-C-5040	00-240-2146
Cord, Nylon, Typ 1	MIL-C-5040	00-240-2154
Cord, Packaging	1138-003-01	01-066-3357
Compound, Corrosion Prevention	MIL-C-85054	01-041-1596
Compound, Silicone	G624	00-880-7616
D-Ring	MA51925-2	00-202-0228
Detergent, General Purpose	MIL-D-16791	00-282-9699
Distress Signal, MK-124, MOD 0	—	01-030-8330
Gage, Dial, Push/Pull	DPPH50	00-473-0108
Die, Cylinder Thread Chaser	1842-008-01	01-069-4040
Duck, Cloth, Nylon	MIL-C-7219	00-765-2863
FLU-8B/P, Automatic Inflator	849AS150	01-092-3087

NAVAIR 13-1-6.1-1

Item Number	Part Number	NIIN Number
Grommet, Brass	MS20230B20	00-291-0302
Handle, Beaded Inflation	975AS121-11	01-120-4752
Ink, Marking Black	SPE-92	00-161-4229
Ink, Yellow Drawing	A-A-59291	00-634-6583
Isopropyl Alcohol	TT-I-735A	00-286-5435
Kit, Gasket	105AS100-5	00-498-6964
Kit, Gasket	105AS100-6	00-113-8920
Lubricant, Sillicone	DC7	00-975-0712
MEK (Methyl Ethyl Ketone)	TT-M-261	00-281-2762
Multimeter, Digital	8600A	01-010-0088
Nitrogen, Water-Pumped	BB-N-411	86 STOCK#'S
O-Ring (Seat Seal Gaskets)	MS28775-012	00-584-0265 00-005-0426
Pencil, Solder	W-S-570	00-204-3855
Post, Snap Fastener	MS27981-5B	00-250-6858
Post, Uni-Directional Snap Fastener	MS27983-4	00-276-4978
Pouch, Dye Marker	68A73D2-41	01-124-3806
Pouch, Flare	68A73D3-61	01-123-2194
Punch, Cutting, 3/16"	3GGG-P-833	00-180-0941
Rivet, Post	MS27986-3B	00-281-4359
Rivet, Cap	MS27986-4B	00-281-2553
Roller, Wooden	GGG-R-00620	00-243-9401
RTV Silicone	DC4	00-843-0802
Scale, Gram	A-A-52021-1	00-514-4117
Screw, Retaining, Piercing Pin	1842-006-01	01-069-6535
Sensor, Plug Cap	1618-012-01 (FW97)	01-092-3088
Snaphook CWBC1	MIL-S-43770/1	01-187-9402
Socket, Snap Fastener	M527981-3B	00-276-4966
Socket, Uni-Directional Snap Fastener	MS27983-2	00-945-2577
Stud, Uni-Directional Snap Fastener	MS27983-3	00-276-4908
Stud, Snap Fastener	MS27981-4B	00-901-9660
Talc, Technical	MIL-T-50036A	01-080-9589
Tape Hook, Typ II, 1" Wide, Sage Green	MIL-F-21840	00-405-2266
Tape Hook, Typ II, 1/2" Wide, Green	MIL-F-21840	00-425-1294
Tape, Pile, Typ II, 1" Wide, Sage Green	MIL-F-21840	00-405-2263

Item Number	Part Number	NIIN Number
Tape, Pile, Typ II, 1-1/2" Wide, Green	MIL-F-21840	00-425-2264
Thread, Nylon, Size A, Typ I	V-T-295	00-204-3803
Thread, Nylon, Size E, Typ II	V-T-295	00-204-3884
Thread, Nylon, Size E, High Temp, Green	MIL-T-83193	00-405-2252
Tool, Valve Core	8769A	01-354-5423
Toluene	TT-T-548	00-281-2002
Pump, Rotary Vacuum	61E44688	00-052-5015
Valve, Inflator, Typ II	MIL-L-25370	00-561-0094
Webbing, Nylon, 3/4"	MIL-W-4088	00-782-3224
Webbing, Nylon, 1", Typ IV	MIL-T-5038	00-261-8579
Webbing, Nylon Tape, 3/4" Wide, Typ II	MIL-T-5038	00-176-8083
Webbing, Nylon Tape, 1" Wide, Green	MIL-T-5038	00-753-6144

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GLOSSARY

ACB. Abbreviation for Aircrew Systems Bulletin. An ACB is a technical publication issued by NAVAIR which directs a one-time inspection of aircrew life support equipment and contains related instructions. Technical Directive code 67 has been assigned to identify ACBs.

ACC. Abbreviation for Aircrew Systems Change. An ACC is a technical publication issued by NAVAIR which directs and provides for, the accomplishment of a change, modification, repositioning or alteration of aircrew life support equipment in service. Technical Directive code 66 has been assigned to identify ACCs.

ACCESSORY. Item attached to a liferaft to improve its effectiveness but not essential to the main function of a raft. For example, a sea anchor and a retaining line are accessories.

ACCESSORY CONTAINER LINE. A 10-foot, 1/8-inch diameter length of nylon cord (MIL-C-5040 Type III) used to secure accessory container to liferaft.

APPROX. Abbreviation for approximately.

AUTOMATIC INFLATOR. An automatic inflation device (FLU-8/P Series) installed on life preservers. The inflator body is constructed with a small explosive charge (squib) and batteries. When the inflator is immersed in water an electrical circuit is completed and fires the squib. The gases from the squib in turn force the piercing pin forward puncturing the CO₂ cylinder which inflates the life preserver.

BACKSTITCH. A stitch made by inserting the needle a stitch length behind and bringing it up a stitch length ahead of the last stitch. Also, sewing back over a row of stitches.

BAG, BALLAST. An open pouch located on under side of one man raft to allow stabilization when boarding.

BARTACK. A concentrated series of zig-zag-like stitches used to reinforce points of stress. A bartack shall have 28 stitches per half-inch (per MIL-O-81900AS).

BEADED INFLATION HANDLE. A handle with beaded grip, attached to inflation assemblies, designed to significantly increase accessibility and to provide a multidirectional pull capability.

BOXSTITCH. A rectangular stitch used to attach and reinforce.

¶. Symbol for centerline.

CAGE. Commercial and Government Entity (CAGE) is a five position alpha-numeric code. CAGE codes are assigned to organizations (entities) that are manufacturers or maintain design control of items of supply procured and cataloged by agencies of the Federal government, Cataloging Handbook H4/H8.

CALENDAR INSPECTION. A detailed searching inspection for material degradation that may have occurred during the preceding calendar interval and provide an opportunity to perform essential preventative maintenance. The inspections are programmed in multiple calendar weeks.

CAUTION. Indicates danger to the equipment. The caution precedes the step or item to which it refers.

CDI. Collateral Duty Inspector. A person whose qualified IAW OPNAV 4790.2 Series and function is to inspect critical steps in maintenance of a piece of equipment.

COMPONENT. An item of equipment making up part of an assembly or subassembly.

CONFIGURATION. The makeup, size, shape and relative location of parts of an item of equipment and its accessories. This includes the composition of materials as well as marking details. The configuration of each equipment is specified by government drawings, military specifications and the modification instructions contained in this volume.

D-RING. A metal fitting shaped in the form of the letter "D", for example, a D-ring on a harness connects to a chest type parachute assembly by means of snap fittings. Also, a slang term for the ripcord handle.

DEBURR. To remove minor irregularities on the surface of machined metals by grinding or filing.

DIA. Abbreviation for diameter.

DOFF. To remove or take off an item of clothing or equipment.

DON. To put on an item of clothing or equipment.

NAVAIR 13-1-6.1-1

DROPPABLE. A hand launched liferaft assembly.

EQUALIZER TUBE. A small corrugated tube which connects the main upper and lower tubes of the twenty-man liferaft. The equalizer tube allows even distribution of CO₂ to each main tube during inflation. After inflation a clamp should be attached to prevent leakage from one tube to another should one tube develops a leak.

EXTERNAL/WING COMPARTMENT. A compartment for stowing liferafts. Access to the compartment is located on the outside of the fuselage or wing.

EYELET. A small metal reinforcement for a hole in cloth, similar to a grommet, except thinner and smaller, and having no washer. The eyelet is used to reinforce lacing holes in small covers, etc.

FABRICATE. To make up or construct an item of equipment, accessory or material.

FAKE. To fold a line or lanyard in a back and forth fashion.

FLOTATION CELL. The inflatable compartments of a life preserver.

FUNCTIONAL TEST. A test which puts an item to use to determine if it operates correctly.

FUSELAGE INSTALLED LIFERAFT. Refers to liferafts stowed within the passenger/cargo compartment of the aircraft.

GROMMET. A metal eye and washer used to reinforce a hole in material, for example, grommets on container side flaps.

GROSS WEIGHT. The gross weight of a carbon dioxide cylinder includes the weight of the cylinder, the weight of the carbon dioxide contained by the cylinder, and the weight of the inflation valve attached to the cylinder.

GUSSET. A triangular insert, as in a garment for strengthening or enlarging.

HEAVING LINE. A line with a rubber donut attached to one end for casting to survivors during rescue operations.

HEM. A border of cloth article doubled back and stitched down; also, to finish a hem.

HOOK TAPE. See [TAPE, HOOK](#).

HSSP. High Speed Soft Pack.

HYDROSTATIC PRESSURE. Pressure or force per unit area exerted by a motionless liquid against the surface of a container.

HYDROSTATICS. A branch of physics that deals with the characteristics of liquids at rest and with the pressure in a liquid or exerted by a liquid on an immersed body.

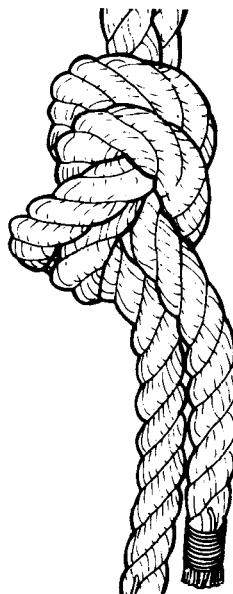
HYDROSTATIC TEST. This is a permanent volumetric expansion of multiplace liferaft CO₂ cylinders. This test is conducted hydrostatically every five years at 5/3 the working pressure of the tested cylinder.

IAW. In Accordance With.

IN. Abbreviation for inches.

INFLATION ASSEMBLY. Inflation valve and carbon dioxide cylinder or cartridge assembled as a unit.

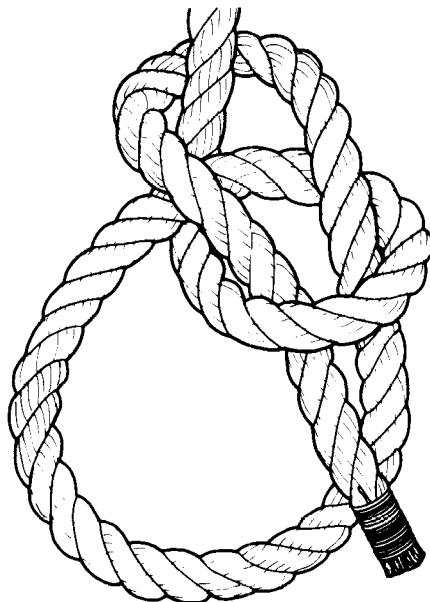
KNOT, BINDER. The simplest method of joining two threads or lines. The two ends are placed side by side and a simple, overhand knot is then tied in both lines simultaneously. It will not slip when drawn tightly. Also called a thumb knot.



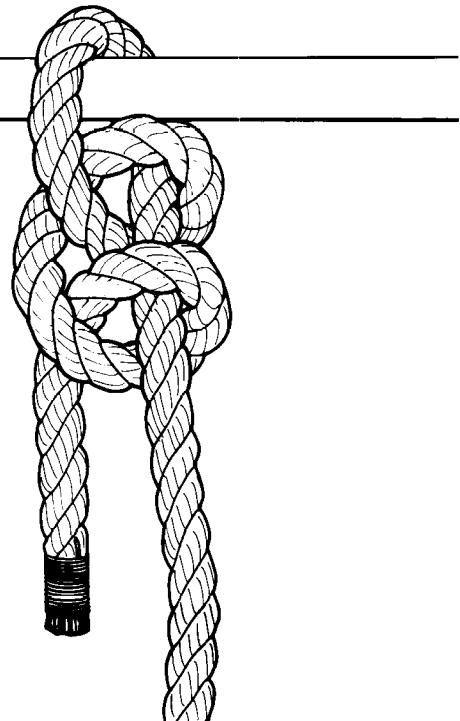
Binder Knot

ZZ000002

KNOT, BOWLINE. A knot formed by making a small overhand loop a desired distance from the end of the line. The end of the line is then passed through the loop from the underside of the main part of the line and back through the small part of the loop. When this knot is drawn tight, it will not slip but still can be easily untied.

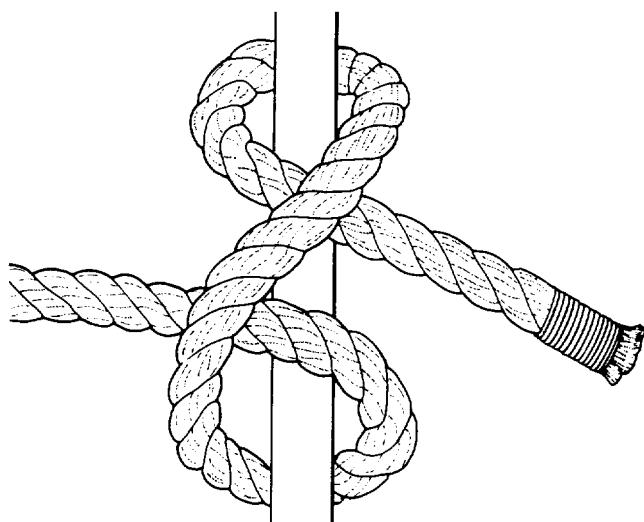
**Bowline Knot**

ZZ000003

**Half-Hitch Knot**

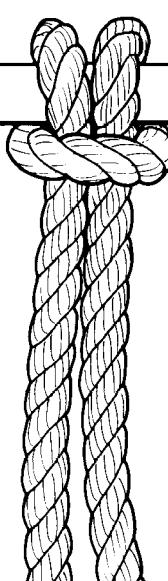
ZZ000005

KNOT, CLOVE-HITCH. A knot formed by making one turn around a post, bringing the end across the line, continuing around the post a second time and passing the end under the second loop.

**Clove-Hitch Knot**

ZZ000004

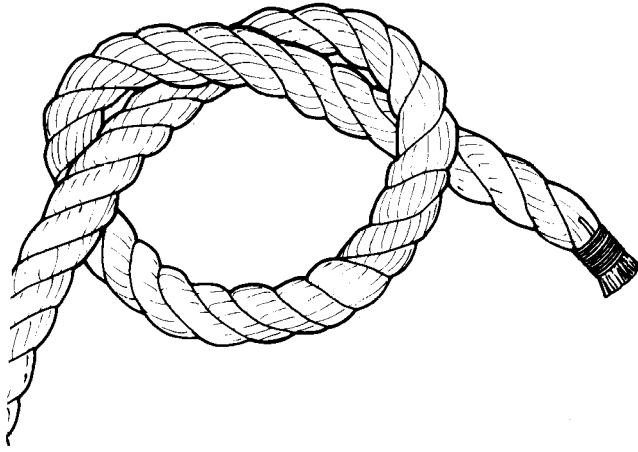
KNOT, HALF-HITCH. A knot formed by passing a cord or line around an object, then passing the free end around the main part of the cord and bringing the free end up through the loop thus formed. It is used in forming safety ties.

**Lark's Head Knot**

ZZ000006

NAVAIR 13-1-6.1-1

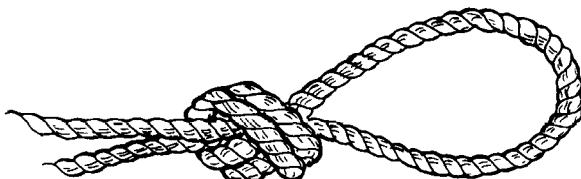
KNOT, OVERHAND. A simple knot tied in the end of a line by forming a loop and passing the end over and down through the loop.



Overhand Knot

ZZ000007

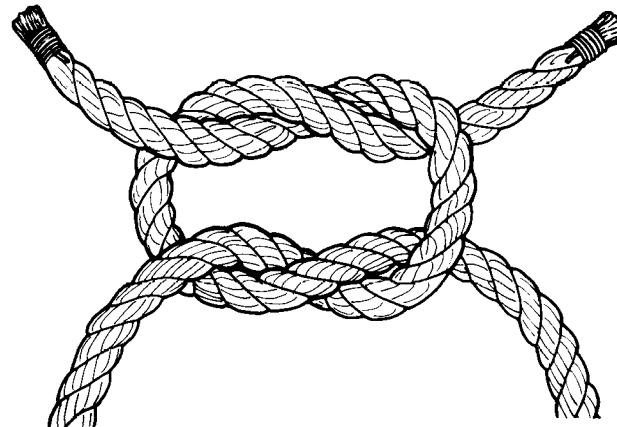
KNOT OVERHAND LOOP. Double the line forming a loop; then tie a simple overhand knot forming as large a loop as desired.



Overhand Loop Knot

ZZ000008

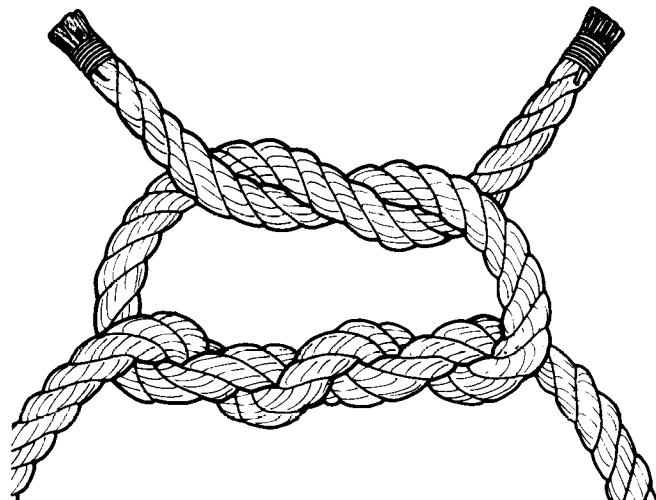
KNOT, SQUARE. A knot formed by passing the end of the cord in the left hand over and under the end in the right hand and then reversing the process by passing the end in the right hand over and under the end in the left hand.



Square Knot

ZZ000009

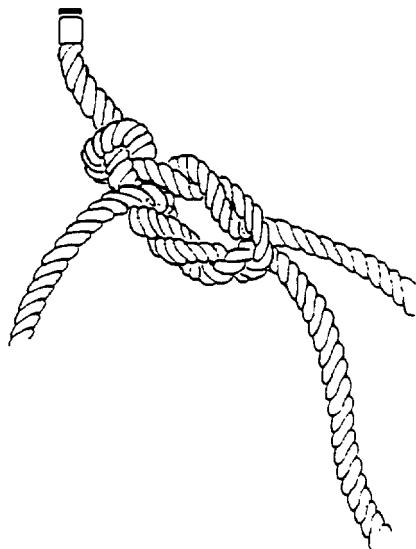
KNOT, SURGEON's. The surgeon's knot is similar to the square knot, except that the first overhand tie is wrapped twice around the cord or line.



Surgeon's Knot

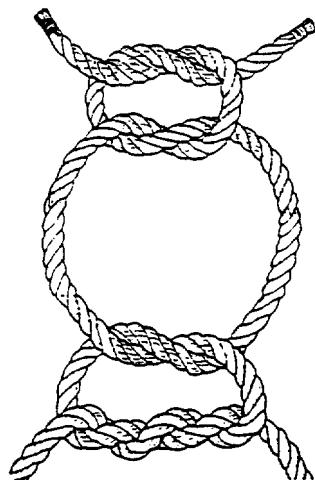
ZZ000010

KNOT, SURGEON'S/KNOT, OVERHAND. A combination of two standard knots formed exactly as the name suggests. Form surgeon's knot near end of line then follow with overhand knot in end of line positioned snugly against surgeon's knot to ensure no slippage.



Surgeon's Knot/Overhand Knot

KNOT, SURGEON'S/KNOT, SQUARE. A combination of two standard knots formed exactly as the name suggests. Form the surgeon's knot first, then form a complete and separate square knot snugly against surgeon's knot.



Surgeon's Knot/Square Knot

LBS. Abbreviation for pounds.

ZZ000011

LIFE LINE. A length of 3/4-inch circumference 1500 pound test nylon rope (MIL-R-17343 NIIN 00-618-0261) routed around the gunwale of raft and tied to each patch loop. It is used as a hand hold during rough seas.

LIFE PRESERVER. Basic life preserver without inflation assemblies and survival items.

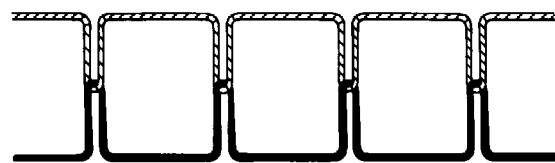
LIFE PRESERVER ASSEMBLY. Life preserver with inflation assembly.

LIFE RAFT. Basic liferaft with accessories attached, but without an inflation assembly, survival items, or cases and containers.

LIFE RAFT ASSEMBLY. Liferaft with inflation assembly.

LOBE. An inflation section of a life preserver.

LOCKSTITCH. A common sewing machine stitch formed when the thread in the needle goes through the material and connects with the bobbin thread. The needle and bobbin thread should lock in the center of the material thickness. (Ref. ASTM-D-6193, Type 301). ■



ZZ000012

Lockstitch

LOCKWIRE. A wire that prevents loosening of a securing device.

MIM. Abbreviation for Maintenance Instruction Manual. MIM manuals are NAVAIR 01 series manuals containing maintenance instructions for specific types of aircraft.

MOORING LINE. A line used to hold fast a vessel or aircraft.

MULTIPLACE LIFERAFT. A liferaft capable of accommodating more than one person.

NA. Not Applicable.

NADC. Naval Air Development Center.

NATOPS. Naval Air Training and Operating Procedures Standardization.

NAVAIR 13-1-6.1-1

NATRA. Naval Air Training Command.

NATSF. Naval Air Technical Services Facility.

NAVAIR. Naval Air Systems Command, Headquarters.

NAVAIRSYSCOM. Naval Air Systems Command.

NFO. Naval Flight Officer.

NIIN. National Item Identification Number.

NOTE. An information item. A note may precede or follow the item or step to which it refers.

ORAL INFLATION ASSEMBLY. Oral inflation valve and tube assembled as a unit.

PACKAGED LIFERAFT ASSEMBLY. Liferaft assembled, packed and ready for use. Packaged liferaft assembly includes liferaft, inflation assembly, accessories, survival items, and one or more containers, all enclosed in an outer container or carrying case.

PAINTER, COTTON CORD. A 60-foot length of cotton cord (T-C-571, Type I, Size 4, NIIN 00-233-6555 or 00-270-5468) with a 50 to 150 pound static breaking strength. The painter line retains deployed liferafts to the aircraft during emergency egress but will easily break if the aircraft sinks.

PERIODIC MAINTENANCE REQUIREMENTS MANUAL (PMRM). Provides general and specific instructions to perform scheduled maintenance at the organizational and intermediate levels. These requirements are performed at specific intervals that are normally based upon calendar time, flight hours, operating hours, or other events that affect equipment performance. The PMRM consists of Maintenance Requirement Cards (MRC's)

PHASED INSPECTION. A division of the total scheduled maintenance requirements into small packages (phases) of approximately the same work content, that are accomplished sequentially at specific intervals.

PILE TAPE. See [TAPE, PILE](#)

PMS. Planned Maintenance System.

PREFLIGHT INSPECTION. An inspection conducted prior to each flight to ensure the equipment is safe for use and to verify proper servicing.

PSIG. Abbreviation for pounds per square inch as measured with a device calibrated to discount the pressure of the earth's atmosphere.

PURGE. To remove undesirable particles or substances from a container by the high velocity injection of a gas or liquid, usually in short bursts.

QUALIFIED PERSONNEL. Graduates of the Navy Aircrew Survival Equipmentman School.

R. Abbreviation for radius.

REF. Abbreviation for reference.

REMOTE INFLATION. That assembly which uses cables and lanyards to actuate the inflation valve.

RETAINING LINE. A length of 1-inch nylon webbing (MIL-T-5038, Type III; NIIN 00-176-8085). The loop end is attached to the liferaft inflation valve and the snap hook end is attached to the aircrewman. It is used to secure liferaft to aircrewman and to provide a rapid means of locating inflation valve.

REEVE. To pass a rope or webbing through a loop, grommet or other opening of a component, often in a prescribed direction or manner.

RIGHT. To restore to an upright position.

RIGHTING LINE. A length of 1/4-inch diameter 1500 pound test nylon rope (MIL-R-17343; NIIN 00-618-0261) used to right an overturned liferaft. It is tied to the liferaft lifeline opposite carbon dioxide cylinder.

SAFETY TIE. Low strength thread which serves to inhibit accidental opening, discharge or separation.

SAR. Search and Rescue.

SCRAP. To discard items, parts or materials which are obsolete or no longer usable.

SDLM. Standard Depot Level Maintenance. Provides for a comprehensive inspection of selected aircraft structures and materials, critical defect correction, preventative maintenance as required, modification and technical directive compliance to insure reliability and operational availability of the aircraft at minimum cost for the established operating service period, and to provide intermediate support during the total service life.

SEA ANCHOR. A drag, usually a nylon-covered conical frame, floating behind a vessel to prevent drifting or to maintain a heading into the wind.

SEAR. To melt and fuse the ends or edges of material, such as nylon cord or webbing, with heat.

SM&R CODES. Source, Maintenance and Recoverability Codes.

SPECIAL INSPECTION. A scheduled inspection with a prescribed interval other than daily, calendar, phased or Standard Depot Level Maintenance (SDLM).

STOWING. The act of putting away in a neat, orderly fashion.

SUPPLY LINE. A 5-foot length of Type III nylon cord (MIL-C-5040; NIIN 00-240-2146) which secures the raft supply and bailer pockets to liferaft.

SURVIVAL ITEM. An item used to protect or sustain life, or to provide a means of signaling for help, for example, food packets and survival radios are survival items.

TAPE, HOOK. Strip of nylon tape with small nylon hooks on one side. Hook tape is used together with pile tape as a fastener.

TAPE, PILE. Strip of nylon tape with small nylon loops on one side. Used with hook tape as a fastener.

TARE WEIGHT. The weight of an empty container; for example, the tare weight of a carbon dioxide cylinder includes the weight of the empty cylinder and the weight of the inflation valve.

TURNAROUND INSPECTION. This inspection is conducted between usage to ensure the integrity, verify proper servicing, and to detect degradation that may have occurred during previous use.

TYP. Abbreviation for typical.

WARNING. Indicates danger to personnel. A warning precedes the item or step to which it refers.

WHIPSTITCH. A stitch used to join two pieces of webbing and to reinforce weak seams.

X. Abbreviation for times or by.

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ALPHABETICAL INDEX

Subject	Paragraph, Figure, Table Number
A	
Accident Evaluation.....	2-6A
Application	
LR-1/Liferaft Assembly.....	4-5, FIG-2
LRU-12/A Liferaft Assembly.....	8-5
LRU-13/A Liferaft Assembly.....	9-5
LRU-14/Self-Sustaining Liferaft Assembly.....	10-5
LRU-15/A Liferaft Assembly.....	11FIG
LRU-18/U Liferaft Assembly.....	6-5, FIG-1
LRU-23/P Liferaft Assembly.....	5-9
LRU-29/P22P-20 Sealed Liferaft Assembly.....	7-9
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man).....	12-7
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man).....	13-5
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man).....	12-7
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man).....	13-5
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man).....	12-7
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man).....	13-5
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man).....	14-7
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man).....	15-7
B	
Barometric Pressure Conversion Chart	
LR-1/Liferaft Assembly.....	T4-7
LRU-12/A Liferaft Assembly.....	T8-8
LRU-13/A Liferaft Assembly.....	T9-8
LRU-14/Self-Sustaining Liferaft Assembly.....	T10-10
LRU-15/A Liferaft Assembly.....	T11-10
LRU-18/U Liferaft Assembly.....	T6-7
LRU-23/P Liferaft Assembly.....	T5-4
C	
Carbon Dioxide (CO ₂) Recharging	
LR-1/Liferaft Assembly.....	4-42
LRU-12/A Liferaft Assembly.....	8-45
LRU-13/A Liferaft Assembly.....	9-45
LRU-14/Self-Sustaining Liferaft Assembly.....	10-45
LRU-15/A Liferaft Assembly.....	11FIG
LRU-23/P Liferaft Assembly.....	5-46
Cementing	
LR-1/Liferaft Assembly.....	4-47
LRU-12/A Liferaft Assembly.....	8-51
LRU-13/A Liferaft Assembly.....	9-51
LRU-14/Self-Sustaining Liferaft Assembly.....	10-51
LRU-15/A Liferaft Assembly.....	11FIG
LRU-18/U Liferaft Assembly.....	6-50
LRU-23/P Liferaft Assembly.....	5-52
Cleaning and Servicing	
LR-1/Liferaft Assembly.....	4-37
LRU-12/A Liferaft Assembly.....	8-38

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
C (Cont)	
Cleaning and Servicing (Cont)	
LRU-13/A Liferaft Assembly	9- 38
LRU-14/Self-Contained Assembly	10-38
LRU-15/A Liferaft Assembly	11- 39
LRU-18/U Liferaft Assembly	6- 38
LRU-23/P Liferaft Assembly	5- 40
LRU-29/PL22P-20 Sealed Liferaft Assembly	7-33
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-30
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-33
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-30
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-33
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-30
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-33
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-32
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-35
Common Repairs and Fabrications Table	
LR-1 Liferaft Assembly	T4-3
LRU-12/A Liferaft Assembly	T8-2
LRU-13/A Liferaft Assembly	T9-2
LRU-14/Self-Contained Assembly	T10-2
LRU-15/A Liferaft Assembly	T11-2
LRU-18/U Liferaft Assembly	T6-2
LRU-23/P Liferaft Assembly	T5-1
Configuration	
LR-1 Liferaft Assembly	4-3
LRU-12/A Liferaft Assembly	8-3
LRU-13/A Liferaft Assembly	9-3
LRU-14/Self-Contained Assembly	10-3
LRU-15/A Liferaft Assembly	11- 39
LRU-18/U Liferaft Assembly	6-3
LRU-23/P Liferaft Assembly	5-3
LRU-29/PL22P-20 Sealed Liferaft Assembly	7-3
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-3
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-3
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-3
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-3
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-3
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-3
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-3
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-3
Confidential and Supersevered	1-8
Contents	1-7

D

Definitions	1- 19
Deflation	
LR-1 Liferaft Assembly	4- 24
LRU-12/A Liferaft Assembly	8- 24

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
D (Cont)	
Deflation (Cont)	
LRU-13/A Liferaft Assembly	9-24
LRU-14/Series Liferaft Assembly	10-24
LRU-15/A Liferaft Assembly	11 F11
LRU-18/U Liferaft Assembly	6-27
LRU-23/P Liferaft Assembly	5-28
Description	
Liferaft Special Tools and Support Equipment	3-1
LR-1 Liferaft Assembly	4-1, F4-1, F4-2, F4-3, F4-4, F4-5, F4-6
LRU-12/A (MK-4) Liferaft Assembly	8-1
LRU-13/A (MK-7) Liferaft Assembly	9-1
LRU-14/Series (MK-12A-1) Liferaft Assembly	10-1
LRU-15/A (MK-20) Liferaft Assembly	11-1
LRU-18/U Liferaft Assembly	6-1, F6-1, F6-2, F6-3, F6-4
LRU-23/P Liferaft Assembly	5-1, F5-1
LRU-29/P22P-20 Series Liferaft Assembly	7-1, F7-1, F7-2
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-1, F12-1, F12-2, F12-3
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-1, F13-1
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-1, F12-1, F12-2, F12-3
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-1, F13-1
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-1, F12-1, F12-2, F12-3
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-1, F13-1
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-1, F14-1, F14-2
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-1, F15-1
Description of NAVAIR 13-1-6.1-1	1-6
Determination of Repairability	
LR-1 Liferaft Assembly	4-46
LRU-12/A Liferaft Assembly	8-50
LRU-13/A Liferaft Assembly	9-50
LRU-14/Series Liferaft Assembly	10-50
LRU-15/A Liferaft Assembly	11 F11
LRU-18/U Liferaft Assembly	6-49
LRU-23/P Liferaft Assembly	5-51
Drawings	1-14
Drilling Safety Wire Holes in Inflation Hardware	
Pull Cable Housing P/N A128-RT-1	
LRU-12/A Liferaft Assembly	8-59
LRU-13/A Liferaft Assembly	9-59
LRU-14/Series Liferaft Assembly	10-61
LRU-15/A Liferaft Assembly	11-61
Inflation Valve P/N A128	
LRU-12/A Liferaft Assembly	8-61
LRU-13/A Liferaft Assembly	9-61
LRU-14/Series Liferaft Assembly	10-63
LRU-15/A Liferaft Assembly	11-63
Inflation Valve P/N IV0303 (Vee Mfg.)	
LRU-12/A Liferaft Assembly	8-60
LRU-13/A Liferaft Assembly	9-60

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
D (Cont)	
Drilling Safety Wire Holes in Inflation Hardware (Cont)	
Inflation Valve P/N IV0303 (Vee Mfg.) (Cont)	
LRU-14/Self-Extinguishing Assembly.....	10-62
LRU-15/A Liferaft Assembly.....	11-62
Inflation Valve P/N 871444	
LRU-12/A Liferaft Assembly.....	8-62
LRU-13/A Liferaft Assembly.....	9-62
LRU-14/Self-Extinguishing Assembly.....	10-64
LRU-15/A Liferaft Assembly.....	11-64
E	
F	
Fabrication	
Anti-chafing Disc	
LR-1/Liferaft Assembly.....	4-52
LRU-23/Liferaft Assembly.....	5-58
Boarding Handle Assembly	
LR-1/Liferaft Assembly.....	4-54
LRU-12/Liferaft Assembly.....	8-65
LRU-13/Liferaft Assembly.....	9-65
Boarding Stirrup Assembly	
LRU-12/Liferaft Assembly.....	8-66
LRU-13/Liferaft Assembly.....	9-66
Cylinder Valve Anti-chafing Sleeve	
LRU-12/Liferaft Assembly.....	8-63
LRU-13/Liferaft Assembly.....	9-63
LRU-14/Self-Extinguishing Assembly.....	10-65
LRU-15/A Liferaft Assembly.....	11-65
Identification Patch	
C-130/Aircraft Wing-Install LRU-15/Liferaft Assembly.....	11-69, F11-21
Liferaft Containee for C-130 Aircraft, LRU-15/Liferaft	11-67
Assembly Containee.....	F11-19
Fastener Locations.....	F11-17
Panel Sections.....	F11-16
Side Panels.....	F11-18
Webbing Locations.....	F11-16
Mockup/C-130 Aircraft Wingwell (LRU-15/Liferaft).....	11-68
Packing Frame Assembly.....	F11-20
Painter Line Pouch and Stowage	
LRU-12/Liferaft Assembly.....	8-58, F8-12, F8-13
LRU-13/Liferaft Assembly.....	9-58, F9-12, F9-13
LRU-14/Self-Extinguishing Assembly.....	10-60, F10-13, F10-14
LRU-15/Liferaft Assembly.....	11-60, F11-10, F11-11
Protective Cover Assembly	
LRU-18/Liferaft Assembly.....	6-42, G-59
Retaining Line	
LR-1/Liferaft Assembly.....	4-53, F4-10

ALPHABETICAL INDEX (Cont)

Subject		Paragraph, Figure, Table Number
	F (Cont)	
Fabrication (Cont)		
Retaining Line (Cont)		
LRU-12/A Liferaft Assembly	8-64, F8-17	
LRU-13/A Liferaft Assembly	9-64, F9-17	
LRU-14 Series I Liferaft Assembly	10-66, F10-18	
Righting Line (LRU-12/A, LRU-13/A)		
LRU-12/A Liferaft Assembly	8-67, F8-2	
LRU-13/A Liferaft Assembly	9-67, F9-2	
LRU-14 Series I Liferaft Assembly	10-67, F10-4	
Survivor Attachment Strap		
LRU-15/A Liferaft Assembly	11-71, F11-22	
Function		
LR-1 Liferaft Assembly	4-7	
LRU-12/A Liferaft Assembly	8-7	
LRU-13/A Liferaft Assembly	9-7	
LRU-14 Series I Liferaft Assembly	10-7	
LRU-15/A Liferaft Assembly	11-7	
LRU-18/U Liferaft Assembly	6-7	
LRU-23/P Liferaft Assembly	5-11	
LRU-29/P22P-20 Sealed Liferaft Assembly	7-11	
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-9	
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-7	
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-9	
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-7	
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-9	
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-7	
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-9	
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-9	
	G	
	H	
Heaving Line		
LRU-12/A Liferaft Assembly	8-71, F8-2	
LRU-13/A Liferaft Assembly	9-71, F9-2	
LRU-14 Series I Liferaft Assembly	10-70, F10-4	
LRU-15/A Liferaft Assembly	11-72, F11-2	
Hydrostatic Test, Liferaft Cylinder		
LRU-12/A Liferaft Assembly	8-42	
LRU-13/A Liferaft Assembly	9-42	
LRU-14 Series I Liferaft Assembly	10-42	
LRU-15/A Liferaft Assembly	11-73	
	I	
Illustrated Parts Breakdown		
Liferaft Special Tools and Support Equipment	3-7, F3-3	
LR-1 Liferaft Assembly	4-65, F4-13	
LRU-12/A Liferaft Assembly	8-76, F8-21	
LRU-13/A Liferaft Assembly	9-77, F9-22	

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
I (Cont)	
Illustrated Parts Breakdown (Cont)	
LRU-14/Self-Reliant Liferaft Assembly	10-75, F10-22
LRU-15/A Liferaft Assembly	11-77, F11-29, F11-30
LRU-18/U Liferaft Assembly	6-64, F6-10
LRU-23/P Liferaft Assembly	5-63, F5-8
LRU-29/P22P-20 Sealed Liferaft Assembly	7-36, F7-3
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-37, F13-2
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-37, F13-2
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-37, F13-2
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-36, F14-6
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-38, F15-2
Illustrated Parts Breakdown Information	2-10, F2-1
Inspection	
LRU-1/Liferaft Assembly	4-18
LRU-12/A Liferaft Assembly	8-18
LRU-13/A Liferaft Assembly	9-18
LRU-14/Self-Reliant Liferaft Assembly	10-13
LRU-15/A Liferaft Assembly	11-18
LRU-18/U Liferaft Assembly	6-18
LRU-23/P Liferaft Assembly	5-20
LRU-29/P22P-20 Sealed Liferaft Assembly	7-18
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-15
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-13
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-15
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-13
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-15
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-13
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-15
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-15
Acceptance Inspection	
LRU-1/Liferaft Assembly	4-20
LRU-12/A Liferaft Assembly	8-20
LRU-13/A Liferaft Assembly	9-20
LRU-14/Self-Reliant Liferaft Assembly	10-20
LRU-15/A Liferaft Assembly	11-20
LRU-18/U Liferaft Assembly	6-23
LRU-23/P Liferaft Assembly	5-24
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-21
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-24
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-21
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-24
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-21
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-24
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-26
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-26
Beaded Inflation Handle Inspection	
LRU-18/U Liferaft Assembly	6-24
Daily Inspection	
LRU-1/Liferaft Assembly	4-18
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-25

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
I (Cont)	
Inspection (Cont)	
Daily Inspection (Cont)	
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-22
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-25
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-22
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-25
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-22
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-24
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-24
Five-Year Vendor Overhaul/Repack Inspection	
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-25
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-25
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-25
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-27
Inflation Assembly, (CO ₂)	
LRU-1/Liferaft Assembly	4-30, F4-1
LRU-12/A Liferaft Assembly	8-30, F8-2
LRU-13/A Liferaft Assembly	9-30, F9-2
LRU-14/Series Liferaft Assembly	10-30, F10-4
LRU-15/A Liferaft Assembly	11-31, F11-2
LRU-18/U Liferaft Assembly	6-32, F6-2, F6-3
LRU-23/P Liferaft Assembly	5-33, F5-2
ISIS Inspection	
LRU-1/Liferaft Assembly	4-20
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-25, F14-2, F14-3, F14-4, T14-1
Liferaft Container/Case, Packed	
LRU-1/Liferaft Assembly	4-21
LRU-12/A Liferaft Assembly	8-21
LRU-13/A Liferaft Assembly	9-21
LRU-14/Series Liferaft Assembly	10-21
LRU-15/A Liferaft Assembly	11-21
LRU-18/U Liferaft Assembly	6-25
LRU-23/P Liferaft Assembly	5-25
Markings Inspection	
LRU-1/Liferaft Assembly	4-28
LRU-12/A Liferaft Assembly	8-28
LRU-13/A Liferaft Assembly	9-28
LRU-14/Series Liferaft Assembly	10-28
LRU-15/A Liferaft Assembly	11-29
LRU-18/U Liferaft Assembly	6-31
LRU-23/P Liferaft Assembly	5-32
Phase Inspection	
LRU-1/Liferaft Assembly	4-20
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-25, F14-2, F14-3, F14-4, T14-1
Place-In-Service Inspection	
LRU-29/P22P-20 Sealable Liferaft Assembly	7-29
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-21

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
I (Cont)	
Inspection (Cont)	
Place-In-Service Inspection (Cont)	
LRU-30A/A [Multi-Place] Liferaft [MPLR] Assembly [8-Man]	13-22
LRU-31/A [Multi-Place] Liferaft [MPLR] Assembly [12-Man]	12-21
LRU-31A/A [Multi-Place] Liferaft [MPLR] Assembly [12-Man]	13-22
LRU-32/A [Multi-Place] Liferaft [MPLR] Assembly [20-Man]	12-21
LRU-32A/A [Multi-Place] Liferaft [MPLR] Assembly [20-Man]	13-22
LRU-33/A [Multi-Place] Liferaft [MPLR] Assembly [20-Man]	14-23, F14-3, F14-4, T14-1
LRU-34/A [Multi-Place] Liferaft [MPLR] Assembly [20-Man]	15-23
Preflight Inspection	
LRU-1 [Liferaft] Assembly	4-19
LRU-12/A [Liferaft] Assembly	8-19
LRU-13/A [Liferaft] Assembly	9-19
LRU-14/Self-Test Liferaft Assembly	10-19
LRU-15/A Liferaft Assembly	11-19
LRU-18/U [Liferaft] Assembly	6-22
LRU-30/A [Multi-Place] Liferaft [MPLR] Assembly [8-Man]	12-25
LRU-30A/A [Multi-Place] Liferaft [MPLR] Assembly [8-Man]	13-22
LRU-31/A [Multi-Place] Liferaft [MPLR] Assembly [12-Man]	12-25
LRU-31A/A [Multi-Place] Liferaft [MPLR] Assembly [12-Man]	13-22
LRU-32/A [Multi-Place] Liferaft [MPLR] Assembly [20-Man]	12-25
LRU-32A/A [Multi-Place] Liferaft [MPLR] Assembly [20-Man]	13-22
LRU-33/A [Multi-Place] Liferaft [MPLR] Assembly [20-Man]	14-24
LRU-34/A [Multi-Place] Liferaft [MPLR] Assembly [20-Man]	15-24
Special Inspection	
14-Day	
LRU-18/U [Liferaft] Assembly	6-22
LRU-29/P22P-20/Self-Test Liferaft Assembly	7-30
30-Day	
LR-1/Liferaft Assembly	4-19
LRU-12/A [Liferaft] Assembly	8-19
LRU-13/A [Liferaft] Assembly	9-19
LRU-14/Self-Test Liferaft Assembly	10-19
LRU-15/A Liferaft Assembly	11-19
LRU-30/A [Multi-Place] Liferaft [MPLR] Assembly [8-Man]	12-25
LRU-31/A [Multi-Place] Liferaft [MPLR] Assembly [12-Man]	12-25
LRU-32/A [Multi-Place] Liferaft [MPLR] Assembly [20-Man]	12-25
224-Day	
LRU-12/A [Liferaft] Assembly	8-20
LRU-13/A [Liferaft] Assembly	9-20
LRU-14/Self-Test Liferaft Assembly	10-20
LRU-15/A Liferaft Assembly	11-20
360-Day	
LRU-18/U [Liferaft] Assembly	6-23
448-Day	
LRU-29/P22P-20/Self-Test Liferaft Assembly	7-31
LRU-30/A [Multi-Place] Liferaft [MPLR] Assembly [8-Man]	12-27
LRU-30A/A [Multi-Place] Liferaft [MPLR] Assembly [8-Man]	13-23
LRU-31/A [Multi-Place] Liferaft [MPLR] Assembly [12-Man]	12-27

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
I (Cont)	
Inspection (Cont)	
Special Inspection (Cont)	
448-Day (Cont)	
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-23
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-27
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-23
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-25
1792-Day	
LRU-29/P22P-20 Sealed Liferaft Assembly	7-32
Survival Items Inspection	
LRU-1/Liferaft Assembly	4-29, FIG-1
LRU-12/Liferaft Assembly	8-29, FIG-5
LRU-13/Liferaft Assembly	9-29, FIG-5
LRU-14/Series Liferaft Assembly	10-29, FIG-0-7
LRU-15/Liferaft Assembly	11-30, FIG-1-7
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-23, FIG-12-1
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-26, FIG-13-1
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-23, FIG-12-1
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-26, FIG-13-1
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-23, FIG-12-1
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-26, FIG-13-1
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-28, FIG-14-1
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-28, FIG-15-1
Three-Year Vendor Repack Inspection	
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-27, FIG-14-1
Visual Inspection	
LRU-1/Liferaft Assembly	4-25
LRU-12/Liferaft Assembly	8-25
LRU-13/Liferaft Assembly	9-25
LRU-14/Series Liferaft Assembly	10-25
LRU-15/Liferaft Assembly	11-26
LRU-18/Liferaft Assembly	6-28
LRU-23/Liferaft Assembly	5-30
Installation	
Carbon Dioxide (CO ₂) Cylinders	
LRU-18/Liferaft Assembly	6-45
Hook Tape on Cylinder Sling (Helo Back Pack)	
LRU-1/Liferaft Assembly	4-57
International Morse Code Patch	
LRU-12/Liferaft Assembly	8-56, FIG-8-11
LRU-13/Liferaft Assembly	9-56, FIG-9-11
LRU-14/Series Liferaft Assembly	10-56, FIG-10-12
Introduction	1-1
J	
K	
L	
Leak Test Fixture	3-3, FIG-3-1
Levels of Maintenance	2-3

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
M	
Maintenance	
LRU-1/Liferaft Assembly	4-1
LRU-12/A Liferaft Assembly	8-1
LRU-13/A Liferaft Assembly	9-1
LRU-14/Sealed Liferaft Assembly	10-11
LRU-15/A Liferaft Assembly	11-1
LRU-18/U Liferaft Assembly	6-1
LRU-23/P Liferaft Assembly	5-1
LRU-29/22P-20 Sealed Liferaft Assembly	7-15
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-13
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-11
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-13
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-11
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-13
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-11
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-13
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-13
Maintenance Documents	
Documenting Maintenance Actions	2-8
Naval Aviation Maintenance Program	2-2
Maintenance Requirements Card	2-6
Major Components	
LRU-29/22P-20 Sealed Liferaft Assembly	7-5
Modifications	
LRU-1/Liferaft Assembly	4-9
LR-1 High Speed Soft Pack and Liferaft Cylinder Sling	4-57
LR-1 Heli Back-Pack CO ₂ Inflation System	4-58
LR-1 Liferaft FLQ-6/P Type Inflation Valve On RSSK Inflation System	4-59
LRU-12/A Liferaft Assembly	8-9
LRU-13/A Liferaft Assembly	9-9
LRU-14/Sealed Liferaft Assembly	10-9
LRU-15/A Liferaft Assembly	11-1
LRU-18/U Liferaft Assembly	6-9, T6-1A
LRU-23/P Liferaft Assembly	5-1
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-11
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-9
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-11
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-9
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-11
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-9
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-11
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-11
MPLR Ordering Information	
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-41, T12-2
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-41, T12-2
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-41, T12-2

N

Naval Aviation Maintenance Program	2-2
--	-----

O

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
P	
Packing Procedure	
Accessory[Container]	12-22, T12-1
LRU-30/A[Multi-Place]Liferaft[MPLR]Assembly[8-Man]	12-22, T12-1
LRU-30A/A[Multi-Place]Liferaft[MPLR]Assembly[8-Man]	13-28
LRU-31/A[Multi-Place]Liferaft[MPLR]Assembly[12-Man]	12-22, T12-1
LRU-31A/A[Multi-Place]Liferaft[MPLR]Assembly[12-Man]	13-28
LRU-32/A[Multi-Place]Liferaft[MPLR]Assembly[20-Man]	12-22, T12-1
LRU-32A/A[Multi-Place]Liferaft[MPLR]Assembly[20-Man]	13-28
LRU-33/A[Multi-Place]Liferaft[MPLR]Assembly[20-Man]	14-30, T14-1
LRU-34/A[Multi-Place]Liferaft[MPLR]Assembly[20-Man]	15-30, T15-1
LR-1[Liferaft]Assembly	4-62
LRU-12/A[Liferaft]Assembly	8-73
LRU-13/A[Liferaft]Assembly	9-73
LRU-14[Sealed]LiferaftAssembly	10-71
LRU-15/A[Liferaft]Assembly	11- T15
LRU-18/U[Liferaft]Assembly	6-61
LRU-23/P[Liferaft]Assembly	5-61
LRU-30/A[Multi-Place]Liferaft[MPLR]Assembly[8-Man]	12-24
LRU-30A/A[Multi-Place]Liferaft[MPLR]Assembly[8-Man]	13-27
LRU-31/A[Multi-Place]Liferaft[MPLR]Assembly[12-Man]	12-24
LRU-31A/A[Multi-Place]Liferaft[MPLR]Assembly[12-Man]	13-27
LRU-32/A[Multi-Place]Liferaft[MPLR]Assembly[20-Man]	12-24
LRU-32A/A[Multi-Place]Liferaft[MPLR]Assembly[20-Man]	13-27
LRU-33/A[Multi-Place]Liferaft[MPLR]Assembly[20-Man]	14-29, T14-4
Re-certified or Replacement Liferaft, LRU-30/A, 31/A, 32/A	12-29
Pneumatic[Inflator]Valve[Check Valve]Core[Tool]	3-5, F3-2
Q	
Qualification Personne	2-4
Quality Assurance	1-16
R	
Recementing Fin or Tape Seams	
LR-1[Liferaft]Assembly	4-49
LRU-12/A[Liferaft]Assembly	8-53
LRU-13/A[Liferaft]Assembly	9-53
LRU-14[Sealed]LiferaftAssembly	10-53
LRU-15/A[Liferaft]Assembly	11- T15
LRU-23/P[Liferaft]Assembly	5-55
Recharging of CO ₂ Cylinders	
LR-1[Liferaft]Assembly	4-42
LRU-12/A[Liferaft]Assembly	8-45
LRU-13/A[Liferaft]Assembly	9-45
LRU-14[Sealed]LiferaftAssembly	10-45
LRU-15/A[Liferaft]Assembly	11- T15
LRU-23/P[Liferaft]Assembly	5-46
Reinforcement and Repair of Oral Inflation Tube Bonding Webs	5-60A

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
R (Cont)	
Relocation of Multi-Place Liferaft Retaining Line Instruction Tag	
LRU-12/A Liferaft Assembly	8- 57
LRU-13/A Liferaft Assembly	9- 57
LRU-14/Sealed Liferaft Assembly	10-58
LRU-15/A Liferaft Assembly	11- 58
Removal Enclosure Assembly	
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-32
Removal of Inlet Valve/Check Elements (Wing Stowed LRU-15/A Liferaft Assembly)	11-69
Rearrange/Overhaul Vendor Information	
LRU-29/P22P-20 Sealed Liferaft Assembly	7-35
Repair	
Carrying Case Handles	
LRU-12/A Liferaft Assembly	8-69
LRU-13/A Liferaft Assembly	9-69
Liferafts	
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-32
LRU-30A/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	13-35
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-32
LRU-31A/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	13-35
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-32
LRU-32A/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	13-35
LRU-33/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	14-34
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-37
O-ring Inflation Tube Bonding Welds	5-60A
Patching	
LR-1 Liferaft Assembly	4- 48
LRU-12/A Liferaft Assembly	8-52
LRU-13/A Liferaft Assembly	9-52
LRU-14/Sealed Liferaft Assembly	10-52
LRU-15/A Liferaft Assembly	11-53
LRU-18/Sealed Liferaft Assembly	6-51
LRU-23/P Liferaft Assembly	5- 54
Replacement	
5-Year	
LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-28
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-28
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-28
Beaded Inflation Handle Assembly	
LRU-18/Sealed Liferaft Assembly	6-56
CO ₂ Inflation Valve	
LRU-18/Sealed Liferaft Assembly	6-54
Enclosure Assembly	
LRU-34/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	15-31
Heaving Line, Liferaft	
LRU-12/A Liferaft Assembly	8-71
LRU-13/A Liferaft Assembly	9-71
LRU-14/Sealed Liferaft Assembly	10-70
LRU-15/A Liferaft Assembly	11-72

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
R (Cont)	
Replacement (Cont)	
Inflation Valve MIL-V-25492 with Inflation Valve MIL-V-81722 (RSSK Installation Only)	
LRU-1/Liferaft Assembly.....	4-56
Inflation Valve Poppet Assembly (Multi-Place Liferafts)	
LRU-12/Liferaft Assembly.....	8-43, F8-6
LRU-13/Liferaft Assembly.....	9-43, F9-6
LRU-14/Series Liferaft Assembly.....	10-43, F10-7
LRU-15/Liferaft Assembly.....	11-44, F11-5
Lifeline	
LRU-12/Liferaft Assembly.....	8-70
LRU-13/Liferaft Assembly.....	9-70
LRU-14/Series Liferaft Assembly.....	10-69
Locking Cones (Liferaft Cases)	
LRU-12/Liferaft Assembly.....	8-72
LRU-13/Liferaft Assembly.....	9-72
LRU-14/Series Liferaft Assembly.....	10-57
LRU-15/Liferaft Assembly.....	11-57
Manifold Assembly (C-130 Wing Installation)	
LRU-15/Liferaft Assembly.....	11-70
Oral Inflation Tube	
AI Mode.....	5-60A
Oral Inflation Valve	
LRU-1/Liferaft Assembly.....	4-61
LRU-18/Liferaft Assembly.....	6-53
LRU-23/Polymer Assembly.....	5-60
Pneumatic Inflator Valve (Check Valve) Assembly	
LRU-18/Polymer Assembly.....	6-55
Quick Ejector Snap (SRU-37/P)	
LRU-18/Liferaft Assembly.....	6-57
Safety Disc and Washer on Inflation Valves	
LRU-1/Liferaft Assembly.....	4-41, F4-7
LRU-12/Liferaft Assembly.....	8-44, F8-7
LRU-13/Liferaft Assembly.....	9-44, F9-7
LRU-14/Series Liferaft Assembly.....	10-44, F10-8
LRU-15/Liferaft Assembly.....	11-45, F11-6
LRU-23/Polymer Assembly.....	5-45, F5-4
Sea Anchor/Mooring Line	
LRU-1/Liferaft Assembly.....	4-50
LRU-12/Liferaft Assembly.....	8-54
LRU-13/Liferaft Assembly.....	9-54
LRU-14/Series Liferaft Assembly.....	10-54
LRU-15/Liferaft Assembly.....	11-55
LRU-23/Polymer Assembly.....	5-56
Securing Line	
LRU-1/Liferaft Assembly.....	4-55
Tether Line	
LRU-18/Liferaft Assembly.....	6-60
Top and Bottom Gaskets (Inflator)	
LRU-18/Liferaft Assembly.....	6-42

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
R (Cont)	
Replacement (Cont)	
Topping-Off Valve, Manual (Multi-Place Liferafts)	
LRU-12/A ₁ Liferaft Assembly	8-68
LRU-13/A ₁ Liferaft Assembly	9-68
LRU-14/SefESI Liferaft Assembly	10-68
LRU-15/A ₁ Liferaft Assembly	11-66
Triangle Link (SRU-37/P)	
LRU-18/A ₁ Liferaft Assembly	6-58
Routing of Inflation Valve Pull Cable (Multi-Place Liferafts)	
LRU-12/A ₁ Liferaft Assembly	F8 ₁
LRU-13/A ₁ Liferaft Assembly	F9 ₁
LRU-14/SefESI Liferaft Assembly	F10-10
LRU-15/A ₁ Liferaft Assembly	F11 ₁
S	
Safety Tying (Thread)	
LRU-1 ₁ Liferaft Assembly	4-64
LRU-12/A ₁ Liferaft Assembly	8-19, B-75
LRU-13/A ₁ Liferaft Assembly	9-19, D-75
LRU-14/SefESI Liferaft Assembly	10-19, H-73
LRU-15/A ₁ Liferaft Assembly	11-19, H-75
LRU-18/A ₁ Liferaft Assembly	6-22, G-24, G-63
Safety Wiring (Wire)	
LRU-12/A ₁ Liferaft Assembly	8-46
LRU-13/A ₁ Liferaft Assembly	9-46
LRU-14/SefESI Liferaft Assembly	10-46
LRU-15/A ₁ Liferaft Assembly	11-47
Soldering of Snaphook Spring Latch on Remote Actuator (Actuation of Multi-Place Liferafts)	
LRU-14/SefESI Liferaft Assembly	10-59
LRU-15/A ₁ Liferaft Assembly	11-59
Stowed Painter Line	
LRU-12/A ₁ Liferaft Assembly	F8-1B
LRU-13/A ₁ Liferaft Assembly	F9-1B
LRU-14/SefESI Liferaft Assembly	F10-14
LRU-15/A ₁ Liferaft Assembly	F11-11
Stowing Sea Anchor and Line	
LRU-1 ₁ Liferaft Assembly	F4-11
Streamers	
LRU-15/A ₁ Liferaft Assembly	11-76, F11-26
Supplementary Publications	1-17
Survivor Attachment Strap	
LRU-15/A ₁ Liferaft Assembly	11-77
T	
Technical Publication Deficiency Report	1-13
Temperature Conversion Chart	
LRU-1 ₁ Liferaft Assembly	T4-6
LRU-12/A ₁ Liferaft Assembly	T8-7

ALPHABETICAL INDEX (Cont)

Subject	Paragraph, Figure, Table Number
T (Cont)	
Temperature Conversion Chart (Cont)	
LRU-13/A Liferaft Assembly	T9-7
LRU-14 Series Liferaft Assembly	T10-9
LRU-15/A Liferaft Assembly	T11-9
LRU-18/U Liferaft Assembly	T6-6
LRU-23/P Liferaft Assembly	T5-3
Testing	
Beaded Inflation Handle Pull Test	
LRU-18/U Liferaft Assembly	6-33
Functional Test	
LR-1 Liferaft Assembly	4-22
LRU-12/A Liferaft Assembly	8-22
LRU-13/A Liferaft Assembly	9-22
LRU-14 Series Liferaft Assembly	10-22
LRU-15/A Liferaft Assembly	11-22
LRU-18/U Liferaft Assembly	6-26
LRU-23/P Liferaft Assembly	5-26
Hydrostatic Test	
LRU-12/A Liferaft Assembly	8-42
LRU-13/A Liferaft Assembly	9-42
LRU-14 Series Liferaft Assembly	10-42
LRU-15/A Liferaft Assembly	11-43
Leakage Test	
LR-1 Liferaft Assembly	4-34, F4-6, F5-7
LRU-12/A Liferaft Assembly	8-34, F8-5, F8-6, F8-7, F8-8
LRU-13/A Liferaft Assembly	9-34, F9-5, F9-6, F9-7, F9-8
LRU-14 Series Liferaft Assembly	10-34, F10-6, F10-8, F10-9, F10-10
LRU-15/A Liferaft Assembly	11-35, F11-4, F11-8, F11-9, F11-10
LRU-18/U Liferaft Assembly	6-34, F6-6, F6-5, F6-6, F6-7
LRU-23/P Liferaft Assembly	5-37, F5-3, F5-3, F5-4
Pull Cable Proof Load Test	
LR-1 Liferaft Assembly	4-23
LRU-12/A Liferaft Assembly	8-23
LRU-13/A Liferaft Assembly	9-23
LRU-14 Series Liferaft Assembly	10-23
LRU-15/A Liferaft Assembly	11-23
LRU-23/P Liferaft Assembly	5-29
Test Pressures, Compartment/Cell	
LR-1 Liferaft Assembly	4-35
LRU-12/A Liferaft Assembly	T8-6
LRU-13/A Liferaft Assembly	T9-6
LRU-14 Series Liferaft Assembly	T10-8
LRU-15/A Liferaft Assembly	T11-8
LRU-18/U Liferaft Assembly	6-36, F6-5
LRU-23/P Liferaft Assembly	5-39
Test Fixture Schematic	
Liferaft Special Tools and Support Equipment	3-3, F3-1
LRU-12/A Liferaft Assembly	8-35, F8-5
LRU-13/A Liferaft Assembly	9-35, F9-5
LRU-14 Series Liferaft Assembly	10-35, F10-6

ALPHABETICAL INDEX (Cont)

Subject		Paragraph, Figure, Table Number
---------	--	---------------------------------------

T (Cont)

Testing (Cont)

Test Fixture Schematic (Cont)

LRU-15/A Multi-Place Liferaft Assembly.....	11-36, F11-4
LRU-18/A Multi-Place Liferaft Assembly.....	6-35, F6-6
LRU-23/A Multi-Place Liferaft Assembly.....	5-38, F5-3

U

Update.....	1-12
-------------	------

V

W

Warranty Information

LRU-30/A Multi-Place Liferaft (MPLR) Assembly (8-Man)	12-35
LRU-31/A Multi-Place Liferaft (MPLR) Assembly (12-Man)	12-35
LRU-32/A Multi-Place Liferaft (MPLR) Assembly (20-Man)	12-35

X

Y

Z